JetMove 206B-230

Digital Servo Amplifier

User Manual

Jetter

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This User Manual is an Integral Part of the JetMove 206B-230:

Type:	
Serial #	
Year of Manuafacture:	
Order #	

CE

To be entered by the customer:

Inventory #	
Place of Operation:	

Significance of this User Manual

This user manual is an integral part of the digital servo amplifier JetMove 206B-230 and

- must be kept in a way that it is always at hand until the digital servo amplifier JetMove 206B-230, will be disposed of.
- Pass this manual on, if the digital servo amplifier JetMove 206B-230 is sold, alienated or loaned.

In any case you encounter difficulties to clearly understand this user manual, please contact the manufacturer.
We would appreciate any suggestions and contributions on your part and would ask you to contact us. This will help us to produce manuals that are more user-friendly and to address your wishes and requirements.

Unavoidable residual hazards for persons and property may result from this digital servo amplifier JetMove 206B-230. For this reason, any person who has to deal with the transport, installation, operation, maintenance, and repair of the digital servo amplifier JetMove 206B-230 must have been familiarised with it and must be aware of these dangers.
Therefore, this person must carefully read, understand and observe this manual, and especially the safety instructions.

Missing or inadequate knowledge of the manual results in the loss of any claim of liability on part of Jetter AG. Therefore, the operating company is recommended to have the instruction of the persons concerned confirmed in writing.

History

Revision	Remarks
2.00	Original issue
3.01	For revisions, please refer to Appendix A: "Recent Revisions", page 105
3.02	This English revision corresponds to German revision 3.01. For revision in chapter 7.2.2, please refer to Appendix A: "Recent Revisions", page 105

Description of Symbols

Danger

This sign is to indicate a possible impending danger of serious physical damage or death.

Caution

This sign is to indicate a possible impending danger of light physical damage.
This sign is also to warn you of material damage.

This sign indicates hazard of life due to electric shock caused by a high operating voltage.

This sign is to indicate hazard of serious physical damage or death due to accidentally touching dangerous parts of the device.

Important!

This sign is to indicate a possible impending situation which might bring damage to the product or to its surroundings.
It also identifies requirements necessary to ensure faultless operation.

Note!

You will be informed of various possible applications and will receive further useful suggestions.
It also gives you words of advice on how to efficiently use hardware and software in order to avoid unnecessary efforts.

· / -

Enumerations are marked by full stops, strokes or scores.

Operating instructions are marked by this arrow.

Automatically running processes or results to be achieved are marked by this arrow.

Reference to PC keyboard and HMI keys.

This symbol informs you of additional references (data sheets, literature, etc.) associated with the given subject, product, etc. It also helps you to find your way around this manual.

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1 Safety Instructions

1.1 General Safety Instructions

The digital servo amplifier JetMove 206B-230 fulfills the accepted safety regulations and standards. Special emphasis was given to the safety of the users.

Further, the user should adhere to the following regulations:
- pertinent accident prevention regulations;
- accepted safety rules;
- EC guidelines and other country-specific regulations.

1.1.1 Intended Conditions of Use

Usage according to the intended conditions of use includes operation in accordance with these operating instructions.

The digital servo amplifier JetMove 206B-230 may only be operated in the closed control cabinet and within the range of the set values, seechapter 5 "Technical Data", page 35.
Do not apply a voltage to the digital servo amplifier JetMove 206B-230 that is higher than the prescribed operating voltage.
The single phase or each of the three phases of the digital servo amplifier JetMove 206B-230 has got an operating voltage ranging between AC 195 V and AC 265 V. Thus, the digital servo amplifier comes under the EG Low Voltage Directive.

It is the explicit purpose of the digital servo amplifier JetMove 206B-230 to torque-, speed- and position-control, and to drive brushless synchronous servo motors. The winding insulation of the motors must be higher than, or at least equal to, the DC link voltage supplied by the servo amplifier.

The digital servo amplifier JetMove 206B-230 is used to control machinery, such as conveyors, production machines, and handling machines.

1.1.2 Usage Other Than Intended

This digital servo amplifier must not be used in technical systems which to a high degree have to be fail-safe, e.g. ropeways and aeroplanes.

The servo amplifier JetMove 206B-230 is not a safety-relevant device according to the machinery directive 2006/42/EG. Therefore, using this servo amplifier for safety-relevant applications as regards safety of persons is neither adequate nor permitted.

If the digital servo amplifier JetMove 206B-230 is to be run under operating conditions, which differ from the conditions mentioned in chapter 3 "Operating Conditions", page 29, the manufacturer is to be contacted beforehand.

1.1.3 Personnel Qualification

Depending on the life cycle of the product, the persons involved must possess different qualifications. These qualifications are required to ensure proper handling of the JetMove 206B-230 in the corresponding life cycle.

Product Life Cycle	Minimum Qualification
Transport / Storage:	Trained and instructed personnel with knowledge in handling electrostatic sensitive components.
Mounting / Installation:	Trained personnel specified in electrical automotive engineering, such as industrial electronics engineers.
Commissioning / Programming:	Trained and instructed experts with profound knowledge of, and experience with, electrical / drive engineering, such as electronics engineer for automation technology.
Operation:	Trained, instructed and assigned personnel with knowledge of operating electronic devices.
Decommissioning:	Specialized personnel with training in electrical engineering, such as industrial electronics technician.

1.1.4 Modifications and Alterations to the Device

For safety reasons, no modifications and alterations to the digital servo amplifier JetMove 206B-230 and its functions are permitted.
Any modifications to the servo amplifier JetMove 206B-230 not expressly authorised by the manufacturer will result in a loss of any liability claims to Jetter AG.

The original parts are specifically designed for the servo amplifier JetMove 206B-230. Parts and equipment from other manufacturers are not tested by Jetter AG, and are, therefore, not released by Jetter AG.
The installation of such parts may impair the safety and the proper functioning of the digital servo amplifier JetMove 206B-230.

Any liability on the part of Jetter AG for any damages resulting from the use of non-original parts and equipment is excluded.

1.1.5 Repair and Maintenance

Repairs at the digital servo amplifier JetMove 206B-230 must not be carried out by the operator. The servo amplifier JetMove 206B-230 does not contain any parts to be repaired by the operator.
For being repaired, the servo amplifier JetMove 206B-230 must be sent to Jetter AG.

The digital servo amplifier JetMove206B-230 is maintenance-free. Therefore, absolutely no inspection or maintenance works are required for the operation of this device.

1.1.6 Disposal

When disposing of the digital servo amplifier, the local environmental regulations must be complied with.

You can disassemble the servo amplifier JetMove 206B-230 into its main components by unscrewing it (aluminum heat sink and side plate, steel casing cover, electronic boards).

1.2 Ensure Your Own Safety

Danger

- Isolate the digital servo amplifier JetMove 206B-230 from the mains, if maintenance works have to be carried out. By doing so, you will prevent accidents resulting from electric voltage and moving parts.
  Please note chapter 1.3 "Residual Dangers", page 17.
- Safety and protective devices, e.g. the barrier and cover of the terminal box or the thermal motor circuit-breaker must not in any case be shunted or by-passed.
- Dismantled protective equipment, such as guards and thermal motor circuit-breakers, must be reattached and checked for proper functioning prior to commissioning.
- Prior to commissioning, the machine manufacturer shall conduct a hazard analysis for the machine and take appropriate measures to prevent personal injury and damage to property resulting from accidental movements.

1.2.1 Malfunctions

- **In the case of malfunctions or other faults, please immediately separate the digital servo amplifier JetMove 206B-230 from the mains.**
  Please note chapter 1.3 "Residual Dangers", page 17.
- Malfunctions or other damages have to be reported to a responsible person at once.
- Secure the servo amplifier JetMove 206B-230 against misuse or accidental use.

1.2.2 Information Signs and Labels

- Markings, information signs, and labels always have to be observed and kept readable.
- Replace damaged or unreadable information signs and labels.

1.2.3 Earthing Procedure

Screw the enclosure of the digital servo amplifier JetMove 206B-230 onto a highly conducting, earthed panel.

Do only use the servo amplifier JetMove 206B-230 at the three-phase, earthed industrial network (TN network, TT network with earthed neutral, 5,000 A max, symmetric rated current at 400 / 480 V + 10 %).
The servo amplifier must not be operated when connected to unearthed networks and to unsymmetrically earthed networks.
A one-phase connection to these mains can be established by means of a mains phase and a neutral wire.
The three-phase connection may only be established by means of an isolating or autotransformer (also refer to chapter "Power supply connection", page 35, and chapter 10 "Connection Diagrams", page 77).

The leakage current of the digital servo amplifier JetMove 206B-230 is greater than 3.5 mA. Therefore, a second protective earth conductor is required in order to avoid electric shocks.
For this, the following measures have to be taken:

- The protective earth conductor must be connected to the PE screw (1) located at the top side of the rack as well as to the PE terminal X1 (2); for this, please refer to Fig. 1.
  The cross-sectional areas of the two earthing conductors must be equal to the cross-sectional areas of the supply lines (1.5 mm^2 min.).
- A durable connection with the power supply of the digital servo amplifier JetMove 206B-230 has to be provided.
- Correct cabling of the PE bus according to the connection diagram must be carried out, chapter 10 "Connection Diagrams", page 77.

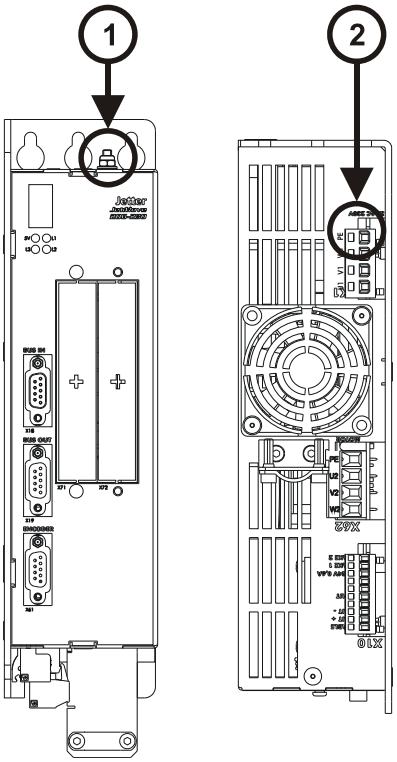


Fig.: 1: Double earthing

Important!

Do not install an earth-leakage current breaker in the mains power supply.

Using an earth-leakage current breaker (FI) within the mains power supply is not possible.
If, in spite of this, an earth-leakage current breaker is installed, it will switch off the digital servo amplifier JetMove 206B-230, although there is no fault.
When a leakage current screen needs to be installed in the JetMove 206B-230, an isolating transformer must be used.

1.3 Residual Dangers

1.3.1 Hazards During Operation

HAZARD caused by high operating voltage!

Danger

Extremely hazardous voltages of up to DC 480 V occur!

Such voltages may result in muscle cramps, burns, unconsciousness, respiratory standstill, or death.

- During operation, all coverings and control cabinet doors have to be kept closed.
- Do not remove the cover.
- Do not disconnect the electric connections of the servo amplifier JetMove 206B-230 when it is live.
- **Do not touch the screws of the terminals X1 and X62 during operation**.
  The terminals have the following meaning:

  X1: AC 230 V voltage supply

  X62: DC motor voltage up to 480 V

Danger

Hot surface hazard!

Caution

During operation, the surfaces, respectively the heat sinks of the digital servo amplifier JetMove 206B-230 can heat up. The internal heat sink can reach temperatures of up to 90 °C.

- **Do not touch the enclosure of the servo amplifier JetMove 206B-230 near the internal heat sink during operation and during the cooling-off period after switching off the device.**
- Make sure that no temperature-sensitive parts have been connected or fastened to the servo amplifier JetMove 206B-230.

DANGER in a potentially explosive atmosphere!

Danger

Do not operate the digital servo amplifier JetMove 206B-230 in a potentially explosive atmosphere.

DANGER of injuries caused by mechanic force!

Caution

The digital servo amplifier JetMove 206B-230 drives a servo motor. This servo motor moves mechanic parts or sharp edges. Therefore, failure or malfunctioning of the digital servo amplifier JetMove 206B-230 can be dangerous for man or damage the manufacturing plant to an amount depending on the respective kind of plant. This should be prevented by installing additional safety devices.

- One safety precaution is to install a second set of limit switches to interrupt the power supply of the motor.
- Another safety precaution would be installing a guard.

Make sure that hazards to persons are precluded even when the drive is rotating unintentionally.

Do not remove any guards.

Danger

Do not wear gloves, lest they should get caught in the rotating drive shaft.

Never touch a rotating drive shaft.

1.3.2 Hazards after POWER is turned OFF

DANGER resulting from electric shock!

Danger

Capacitors installed in the servo amplifier can still have dangerous voltages present up to five minutes after switching off the operating voltage.

- **Always wait** at least five minutes after switching off the device, before separating it from the mains or loosening the connections.
- **Always wait** at least ten minutes after switching off, before taking the following actions:
  - Touching the screws of the terminals X1 and X62
  - Disconnecting the terminals and touching the contacts

1.4 Instructions on EMI

The digital servo amplifier JetMove 206B-230 is intended for use in industrial surroundings. It may cause radio interferences when used in residential areas. It is operated at the operator's own risk.

The noise immunity of a system is determined by the weakest component of the system. For this reason, correct wiring and shielding of cables is of paramount importance.

Important!

Measures for increasing immunity to interference:

- Ground the enclosure according to chapter 1.2.3 "Earthing Procedure", page 15.
- Connect all grounding terminals of the JetMove 206B-230. A double grounding terminal is required!
  – Connect the protective earth terminal located on the enclosure
  – Connect the protective earth (PE) to terminal X1.
  Please refer to fig. 1 on page 16
- Connect the motor lines. If applicable, an optional line filter must be near the servo amplifier. Shield cables on both ends.
- If a motor power cable is used which includes cores for brake control, the brake control cores must be separately shielded. Earth the shielding at both ends.
- The distance between the optional line filters and the servo amplifier JetMove 206B-230 must be as short as possible.
- Follow the instructions given in Application Note 016 "EMC-Compatible Installation of the Electric Cabinet" published by Jetter AG.

The following instructions are excerpts from Application Note 016:

- Screw the enclosure of the digital servo amplifier JetMove 206B-230 onto a highly conducting, earthed panel.
- On principle, **physical separation** should be maintained between signal and voltage lines. We recommend spacings greater than 20 cm. Cables and lines should cross each other at an angle of 90°.

- For the following lines, shielded cables are to be used:
  Analog lines, data lines, motor cables coming from inverter drives (servo output stage, frequency converter), lines between components and interference suppressor filter, if the suppressor filter has not been placed at the component directly.

- **Both sides of the cable** must be shielded.

- Unshielded wire ends of shielded cables should be as short as possible.

- The **entire shield** must be drawn behind the isolation and then be clamped under an earthed strain relief **with the greatest possible surface area.**

When male connectors are used:

- The shield **must,** in its entire perimeter, be drawn behind the shielding clamp of the metallized connector housing, respectively of the EMC gland bushing, its greatest possible surface area being clamped under a strain relief.

- Only use metallized connectors, e.g. SUB-D with metallized housing. Make sure that the strain relief is directly connected with the housing here as well (see fig. 2).

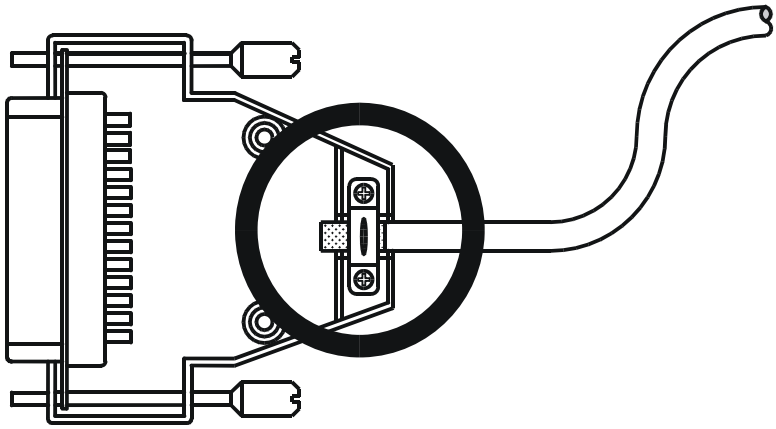


Fig.: 2: Shielding of SUB-D connectors in conformity with EMC standards

If the shield cannot be attached to the connector, for example, with a screw type terminal:

- It is important that shield and strain relief are highly conductive and directly connected to a grounded surface with the greatest possible surface area. When doing so, grounding must be implemented in a way that the unshielded portion of the cable is as short as possible (refer to fig. 3).

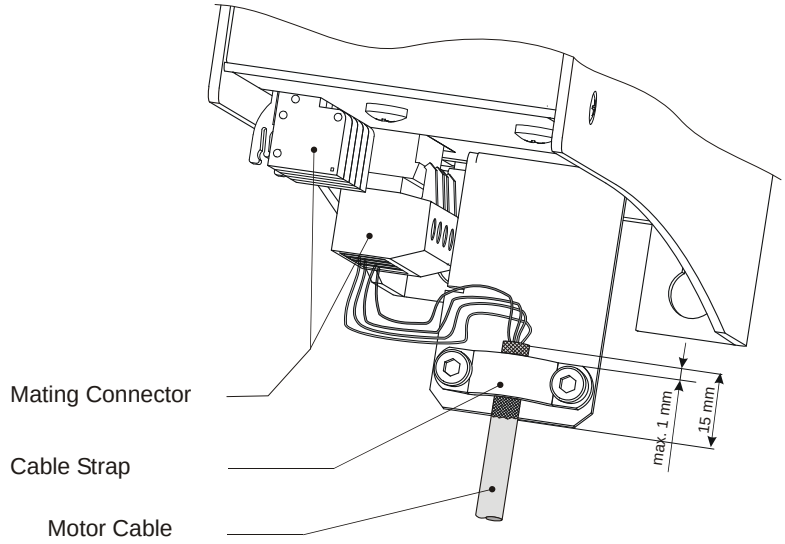


Fig.: 3: Shielding of screw terminals in conformity with the EMC standards

2 JetMove 206B-230 - Installation Instructions

2.1 Scope of Delivery

- Digital servo amplifier JetMove 206B-230
- The mating connector is plugged on.
- Cable strap serving as strain relief and motor cable shield
- User manual

Accessories

The accessories are not part of the scope of delivery!

- System bus cable of cable assembly number 530 x.x m; length: 0.2 m to 5.0 m. See chapter 7.7 "Jetter System Bus", page 67
- Motor power cable, see chapter 7.2 "Motor Connection", page 47
- Resolver cable, see chapter 7.3 "Resolver Connection", page 56
- HIPERFACE cable, see chapter 7.4 "HIPERFACE Connection", page 58
- Synchronous servo motors, e. g. the Jetter motor series JL, JK, or JH
- Motor circuit braker, see chapter 5 "Technical Data", page 35
- Circuit braker, see chapter 5 "Technical Data", page 35
- Isolating transformer or autotransformer
- Mounting screws, 2 pcs.; refer to fig. 4, page 25

Note!

If you are not sure which mounting accessories you will need, please contact Jetter AG.

2.2 Mechanical Installation

- Prior to installing the digital servo amplifie, check it for possible transport damages.
- Check the shipment for completeness.
- To ensure proper functioning of the JetMove 206B-230, check whether the mounting plate in the electric cabinet is unpainted.
- The only possible mounting position is vertical - see siehe fig. 4, page 25.
- For sufficient air flow there has to be a clearance of 100 mm above and below the device.
- Mark on the panel two positions for the fastening screw threads of the JetMove 230B-230 (see fig. 4, page 25).
- Drill the holes and cut the respective threads into the panel.
- Screw the corresponding fitting bolts into the thread by approximately half of their length.
- By means of the oblong holes in the rear plate, hang up the JetMove 206B-230 by the fitting bolts; then screw them tightly.

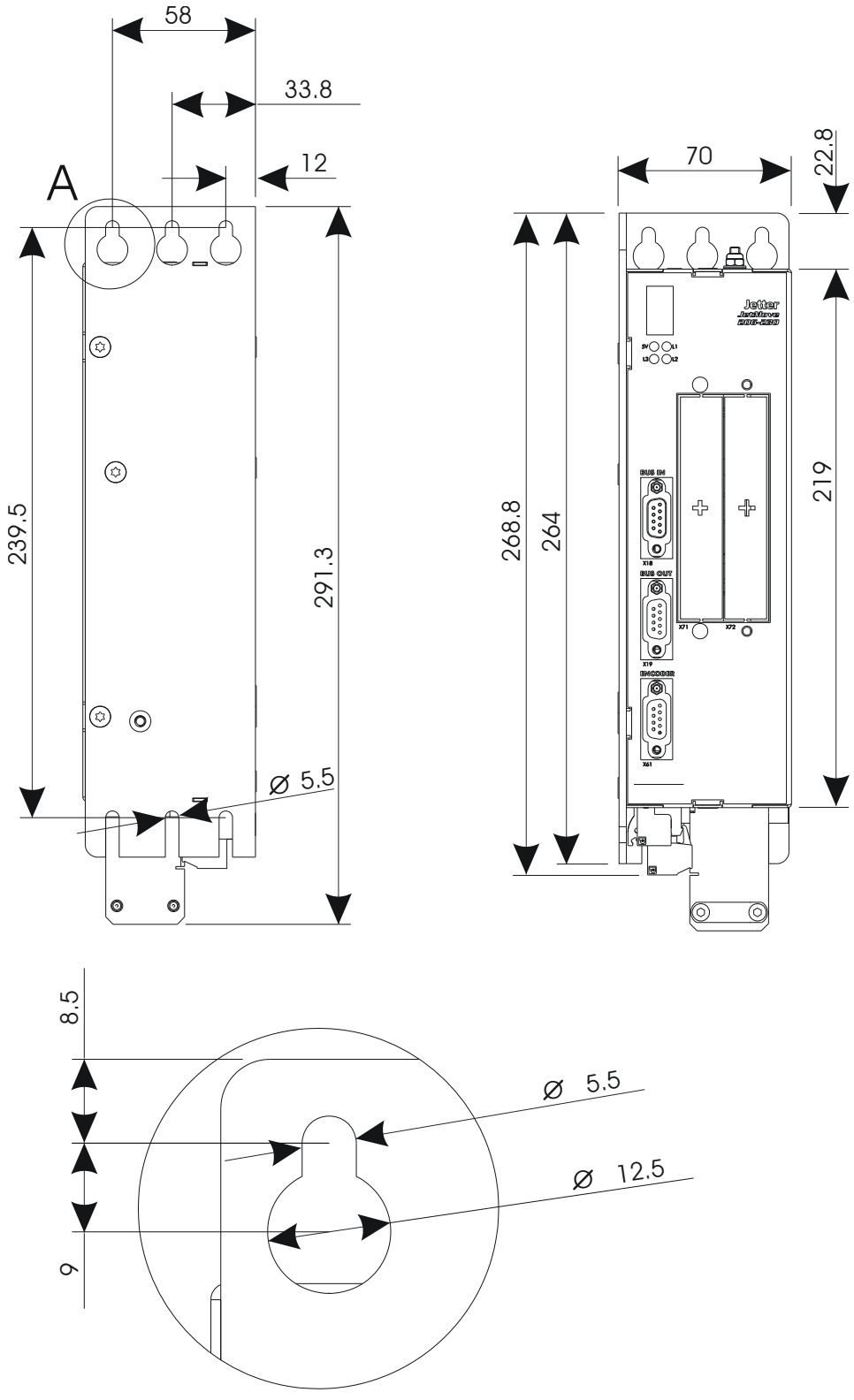


Fig.: 4: Rear and front view of the JetMove 206B-230 enclosure with mounting holes

2.3 Electrical Installation

- Check for correct motor and servo amplifier assignment.
- Compare rated voltage and continuous rated current of servo amplifier and motor.
  The motor must be isolated against voltages of DC 480 V min.; also refer to "Compatible Synchronous Servo Motors" on page 38.
- Connect the JetMove 206B-230 according to the connection wiring diagram shown in chapter 10 "Connection Diagrams", page 77.
  Especially check the power lines for appropriate protection, see "Overload protection" on page 35.
  Protecting the motor cables is not advisable.
- Select the cables according to standards.
- Verify that all earthing cables are connected (double earthing).
- To connect resolvers or power units you can use prefabricated cables available from Jetter or opt for self-made cables. Please refer to chapter 7 "Description of Connections", page 45.
- Please regard the following items regarding installation according to EMC:
  – If possible, run control cables and power cables separately;
  – Connect resolver;
  – Use shielded terminals or EMC-compatible connectors;
  – Connect holding brake, if available, and connect shields on both sides of the cables;
  – Connect the motor lines according to fig. 3, page 22.

  Please further note thechapter 1.4 "Instructions on EMI", page 20.

2.4 Checking the Installation

- Check motor and servo amplifier wiring and connections by means of the connection diagrams used.
- Check the holding brake, if existing, for proper functioning.
- Check to see whether all necessary protection measures against accidental contact with live or moving parts have been taken.
- Carry out any other checks specific to, or required, for your system.

2.5 Notes on Safety as regards the Installation

HAZARD caused by high operating voltage!

Warning

Extremely hazardous voltages of up to DC 480 V may occur!

Please, observe the following precautions in order to avoid injuries such as muscle cramps, burns, unconsciousness, respiratory standstill or possibly death:

- Have installation and maintenance jobs carried out by qualified personnel onlychapter 1.1.3 "Personnel Qualification", page 12.
- Switch off the operating voltage.
- Please take into account the information on residual dangers given in chapter 1.3.2 "Hazards after POWER is turned OFF", page 19.
- Before carrying out installation and maintenance jobs, separate the servo amplifier JetMove 206B-230 and all connected devices from the mains (pull out the mains plug).

2.6 Notes on Safety as regards Commissioning

HAZARD caused by high operating voltage!

Warning

Extremely hazardous voltages of up to DC 480 V may occur!

Please, observe the following precautions in order to avoid injuries such as muscle cramps, burns, unconsciousness, respiratory standstill or possibly death:

- Have commissioning jobs carried out by qualified personnel only, see chapter 1.1.3 "Personnel Qualification", page 12.

Before energizing the device make sure that the following requirements are complied with:

- Reattach dismantled protective equipment and check it for proper functioning.
  This way, protection from moving parts of the machine will be achieved.
- Secure the servo amplifier JetMove 206B-230 against accidental contact with conductive parts and components.
- Only connect devices or electrical components to the signal lines of the digital servo amplifier JetMove 206B-230 (Enable, Limit+/-, REF, BRAKE 1 and BRAKE 2) that have been sufficiently isolated against the connected electric circuits. These signal lines may only be connected with units that have got the ground potential of the DC 24 V power supply.
- Only connect resolver, HIPERFACE and servo motor to the servo amplifier, if they have been sufficiently isolated from the connected electric circuits.
- The leakage current of the digital servo amplifier JetMove 206B-230 is greater than 3.5 mA. Therefore, a second protective earth conductor is required in order to avoid electric shocks.
  For this, the measures listed in chapter 1.2.3 "Earthing Procedure", page 15, have to be taken.
- Always carry out each commissioning, even a short functional test, with correctly connected PE bus.

3 Operating Conditions

Operating Parameters		
Ambient Conditions		**Reference**
Transport conditions (units within packing)	Temperature: -25 °C ... 70 °C Air humidity: 5 % ... 95 % Non-condensing	DIN EN 50178
Storage conditions (units within packing)	Temperature: -25 °C ... 55 °C Change max. 20 K/h Air humidity: 5 % ... 95 % Non-condensing Max. storage time: 1 year	DIN EN 50178
Ambient temperature	0 ... 45 °C (45 °C ... 55 °C with derating of 2.5 %/K) Please be careful of sufficient cooling	DIN EN 50178
Air humidity	5 % ... 85 % Non-condensing	DIN EN 50178
Pollution degree	2	DIN EN 50178
Corrosion immunity / chemical resistance	No special protection against corrosion. Ambient air has to be free from higher concentrations of acids, alcaline solutions, salts, metal vapours, or other corrosive or electroconductive contaminants.	DIN EN 50178
Operating altitude	Up to 1,000 m above sea level. 1,000 to 2,500 m above sea level with derating of 1.5 % per 100 m	DIN EN 50178

Operating Parameters		
Mechanical Conditions		**Reference**
Free falls withstanding test	Within original packing, the device withstands dropping over all of its edges.	DIN EN 50178 DIN EN 60068-2-31
Vibration resistance	• 10 Hz ... 57 Hz at an amplitude of 0.075 mm • 57 Hz ... 150 Hz: 1.0 g constant acceleration • 1 octave per minute, 10 frequency sweeps (sinusoidal), all three spatial axes	DIN EN 50178 DIN EN 60068-2-6
Degree of protection	IP20	DIN EN 60529
Mounting position	Vertical (refer to fig. 4, page 25) For sufficient air flow there has to be a clearance of 100 mm above and below the device.	
Electrical safety conditions		**Reference**
Class of protection	I	DIN EN 61800-5-1
Dielectric strength Isolation	Power to earth and power to logic 1.7 kVdc, 2 s Power to earth and power to logic > 1 MOhm at 500 V	DIN EN 61800-5-1 DIN EN 60146-1-1 DIN EN 60204
Protective connection	12 V, 25 A, 0.1 Ohm	DIN EN 61800-5-1
Overvoltage category	III	DIN EN 61800-5-1 DIN VDE 0110-1

Important!

Measures to avoid damages in transit and storage:

The packaging material and the storage place are to be chosen in a way that the values given in the above table "Operating Parameters" on page 29 are kept to.

EMC		
Emitted Interference		
Parameter	**Value**	**Reference**
Housing	• Frequency band 30 ... 230 MHz, limit 30 dB (µV/m) at 30 m • Frequency band 230 ... 1,000 MHz, limit 37 dB (µV/m) at 30 m (Class B)	DIN EN 61800-3
Line AC	• Frequency band 0.15 ... 0.5 MHz, limit 79 dB (µV) • Frequency band 0.5 ... 30 MHz, limit 73 dB(µV)	DIN EN 61800-3

Important!

This is a product of restricted availability according to IEC/EN 61800-3. This module can cause radio interferences in residential areas. In this case, the user must take adequate measures to prevent this.

Additional line filters can be helpful here. See "Line filter" on page 36.

EMC		
Interference Immunity: Enclosure		
Parameters	**Value**	**Reference**
HF field amplitude-modulated	Frequency band 80 ... 1,000 MHz; test field strength 10 V/m AM 80 % at 1 kHz Criterion A	DIN EN 61000-4-3 DIN EN 61800-3
ESD	Contact discharge: Test peak voltage 6 kV Criterion B	DIN EN 61800-3 DIN EN 61000-4-2

EMC		
Interference Immunity: Power Connections and Power Interfaces		
Parameters	**Value**	**Reference**
Conducted radio disturbances	Frequency 0.15 ... 80 MHz Test voltage 10 V AM 80 % at 1 kHz Criterion A	DIN EN 61800-3 DIN EN 61000-4-6
Burst (fast transients)	Test voltage 2 kV tr/tn 5/50 ns Repetition frequency 5 kHz Criterion B	DIN EN 61800-3 DIN EN 61000-4-4
Voltage surges	tr/th 1,2/50 µs, 8/20 µs 1 kV (phase to phase) 2 kV (phase to ground) Criterion B	DIN EN 61800-3 DIN EN 61000-4-5
Interference Immunity: Process, Measuring and Control Lines		
Parameters	**Value**	**Reference**
Conducted radio disturbances	Frequency 0.15 ... 80 MHz Test voltage 10 V AM 80 % at 1 kHz Criterion A	DIN EN 61800-3 DIN EN 61000-4-6
Burst (fast transients)	Test voltage 2 kV tr/tn 5/50 ns Repetition frequency 5 kHz Criterion B	DIN EN 61800-3 DIN EN 61000-4-4
Interference Immunity: Signal Interfaces		
Parameters	**Value**	**Reference**
Conducted radio disturbances	Frequency 0.15 ... 80 MHz Test voltage 10 V AM 80 % at 1 kHz Criterion A	DIN EN 61800-3 DIN EN 61000-4-6
Burst (fast transients)	Test voltage 1 kV tr/tn 5/50 ns Repetition frequency 5 kHz Criterion B	DIN EN 61800-3 DIN EN 61000-4-4

4 Mounting Dimensions

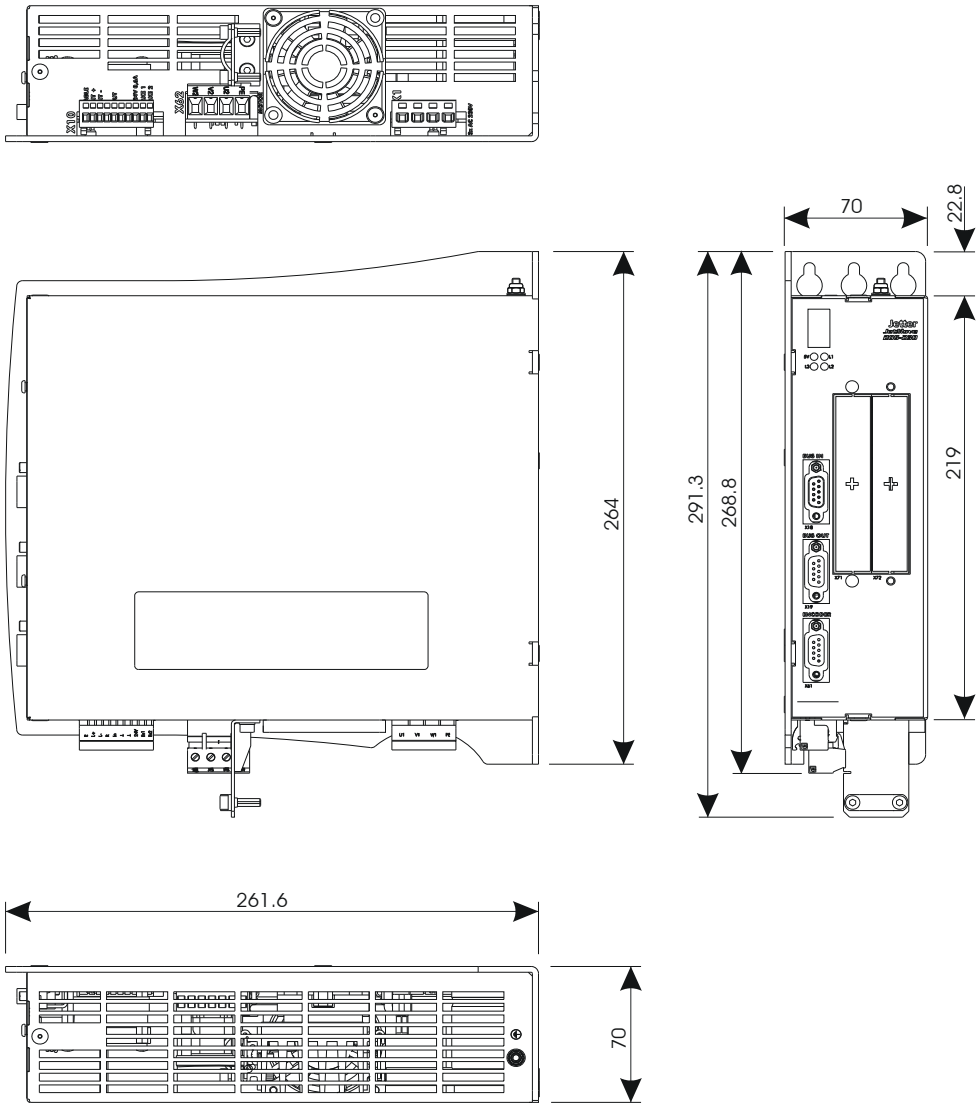


Fig.: 5: Mounting dimensions of the JetMove 206B-230

For installation, please also refer to fig. 4 on page 25.

5 Technical Data

5.1 Electrical Specifications

Electrical Specifications	
Rated voltage supply	• Direct supply U_{eff} = 230 V Common mode voltage 2 % max. Power dissipation 3 ms max. • 48 ... 62 Hz Frequency change max. 2 %/s
Power supply connection • for a rated power of the motor,> 1kW, a three-phase connection is standard.	• 1-phase: direct (U_{eff} = 230 V: L to N) • 3-phase: via autotransformer or isolating transformer e.g. Primary circuit: U_{eff} = 3 x 400 V. Secondary circuit: U_{eff} = 3 x 230 V **See "Note 1!" on page 37.**
Power supply tolerance	U_{eff} = 195 V ... 265 V (-15 % ... + 15 %)
Inrush current limitation	< 30 A limited to 50 ms during the switch-on-sequence **Refer to "Time between deactivating and activating the mains power supply" on page 38**
Overload protection	For each phase an external overload protection is required, for example – circuit breaker 10 A C – fuse 10 A M (medium time lag) – motor circuit breaker 10 A For systems with UL approval, use overload protection devices that are UL listed (acc. to UL 508) (HKJH) and a self-protected combination motor controller (specification: 230 V, 10 A) for **UL-certified** systems. The JetMove 206B-230 is suitable for use on a circuit capable of delivering not more than 50,000 rms symmetrical Ampere, 600 Volt $_{eff}$ max.
Output voltage of the motor	Three-phase with 325 V typical (480 V max.)
Motor output current at an ambient temperature of 45 °C	Nominal current: I_{eff} = 6 A Spitzenstrom min. 5 Sekunden: I_{eff} = 12 A (The duration depends on the temperature of the heat sink) **See "Note 2!" on page 37.**

Electrical Specifications	
Continuous output	1.4 kW (for a three-phase mains connection)
Short-circuit protection, motor side	Designed for • phase to phase • phase to earth
Motor overload protection	See "Motor Protection" on page 39.
Motor cable Cable size Material Capacitance Temperature class Maximum length of the motor cable	 4 * min. 1.5 mm^2 (AWG 16 min.) Copper < 150 pF/m > 60 °C 50 m max. (for greater lengths please contact Jetter AG)
Line filter	Line filter ensuring EMC in a residential environment to DIN EN 61800-3 with no limitations. The following filters can be applied with input circuits: – FMAC-931-0810 8 A – FMAC-932-1610 16 A – FMAC-932-2510 25 A – FMAC-934-3610 36 A **See "Note 3!" on page 37.**
Voltage supply of processor logics (Demands on the power supply module)	• DC 24 V (20 ... 30 V) • ≤ 0.6 A • The voltage output of the power supply unit must comply with the SELV or PELV type.
Internal ballast resistor	• Resistor: 120 Ω • Continuous output: 75 W • Maximum capacity internally limited to 1 kW at 0.6 s (warning and error message)
Residual voltage	To havoid hazard of electrical shock wait at least 5 minutes after switching off the digital servo amplifier before attempting to pull out the plug or remove this unit (refer to page 19).
Leakage current	> 3.5 mA **See "Danger resulting from electric shock!" on page 38.**

Electrical Specifications	
Digital inputs – Enable (E) – Reference switch (R) – Limit switch right (L+) – Limit switch left (L-) – Input (Inp)	DC 20 V ...30 V related to the ground potential of voltage supply of processor logics, with an input current of 7.5 mA max. each. See "Digitale Inputs, Logic Power Supply" on page 65.
Braking relay (contacts: Br1 and Br2)	V_{max} = DC 30 V I_{max} = DC 2 A Contact: N/O connected to BR1 and BR2 on X10 The lines may only be connected to devices that are related to the same potential as the power supply of the controller logic. Can be switched by the control program of PLC or by operating system of JetMove 206B-230 together with software enable.
Power dissipation P_v	100 W max.

Note 1!

When a transformer is used:
The neutral point on the secondary side of the circuit must be grounded.

Note 2!

Active cooling:
- The fan is activated at 60 °C and deactivated at 40 °C.
- The overtemperature protection is activated at 85 °C.
- The overtemperature alarm is activated at 80 °C.
- The duration or the peak current are measured at a starting temperature of 45 °C at the heat sink.

Note 3!

A line filter can supply several digital servo amplifiers JetMove 206B-230, as soon as I_f (the current of the line filter) is greater than the total current of the connected servo amplifiers.

Important

Time between deactivating and activating the mains power supply

If the drive system has been run by motor power (speed and torque at the moment) and the mains power supply is deactivated, the inrush current limitation unit must cool down for 2 to 3 minutes. If this is not considered, the inrush current limitation unit can be destroyed.

Danger resulting from electric shock!

Warning

In order to prevent electric shocks, ground the digital servo amplifier JetMove 206B-230 **by all means** via two positions; for this, refer to chapter 1.2.3 "Earthing Procedure", page 15.

Compatible Synchronous Servo Motors	
Motor types	Jetter motors of the series JL, JK, and JH, and Bautz motors of the series M and F. Please refer to "Jetter Motor Catalog" or contact the sales department of Jetter AG.

Note!

In case you intend to use motors other than the above mentioned types, please contact Jetter AG.

5.2 Motor Protection

There are three ways of motor protection.

5.2.1 Built-In Temperature Sensor

The JetMove 206B-230 servo amplifier is able to run by means of three different temperature sensors and to evaluate their data:

Sensor type	Type of sensor signal evaluation
KTY83-110	The temperature is measured in °C. The warning level is adjustable. An error message is activated at maximum motor temperature
PTC	Go-no-go decision An error message is activated at maximum motor temperature
Temperature switch	Go-no-go decision An error message is activated at maximum motor temperature

5.2.2 I²t Calculation

The digital servo amplifier JetMove 206B-230 calculates the model of motor power loss by an I²t calculation. The calculated value is a measure of the average power dissipation of the motor. It is calculated in percent of the maximum motor power dissipation.
For this calculation it is important, that the parameters are entered correctly:
– Continuous rated current (either continuous rated motor current or continuous rated amplifier current, taking the lower value of the two)
– Overload factor
– and time constant of the motor

The I²t calculation has to be activated by JetSym or by the PLC program.
It is possible to parameterize the warning level. The error level (error 30) is set to 100 %.

The I²t value is readable in a variable of JetMove 206B-230 through JetSym or the PLC.

The digital servo amplifier JetMove 206B-230 calculates the percentage of motor power loss according to the following formula:

$$x(t) = 100\% \times \left(\frac{\text{average motor current}}{\text{rated current}}\right)^2 \times \left(1 - e^{-\frac{t}{T}}\right)$$

x(t) = displayed value of motor power loss in %
t = Time since start of motor running it with the average current (in seconds)
T = Motor time constant (in seconds)

The formula shows that the 100 % value will never be reached as long as the average motor current is lower than the continuous rated current of the motor.
Further, calculating always starts by 0 (at t = 0, the result of the equation is 0). After some time that is by far longer than the motor time constant, the result does virtually not change any more.
The time till error stop (x = 100 %) is a result of the following formula:

$$t = -T \times \ln\left[1 - \left(\frac{\text{rated current}}{\text{average motor current}}\right)^2\right]$$

After reset, the values of the important parameters are:

Continuous rated current:	6 A
Overload factor:	2
Motor time constant	1,800 s (30 min)

With these parameters the 100 % error level will be reached if, for example the motor is run by a current of 12 A for about 8 minutes and 30 seconds.

Important

Because of the fact that after reset the I²t calculation always starts with zero, the motor overload calculation is wrong if the motor is already hot when the digital servo amplifier JetMove 206B-230 is switched on (i. e. at the time of parameters of I²t calculation are written after switching on 24 V logic power supply).

5.2.3 Motor Overload Calculation to UL

The UL standard prescribes a motor overload detection for a servo amplifier according to the following criteria:

The "trip current" is defined to be 1.15 times the user-set continuous rated current-

- If the average motor current corresponds to the trip current, the overload protection has to switch off the motor after a limited time.
- If the average motor current is 2 times higher than the trip current the overload protection has to switch off the motor after at least 8 minutes.
- If the average motor current is 6 times higher than the trip current the overload protection must switch of the motor after at least 20 seconds.

This protection (error message 31 is activated) can be parameterized only through the rated current value.
The motor overload protection is always active and cannot be deactivated.

Important

Because of the fact that after reset the motor overload calculation always starts with zero, the result is wrong if the motor is already hot when the digital servo amplifier JetMove 206B-230 is switched on (i. e. at the time of connecting the 24 V logic power supply).

6 Drive Controller Structure

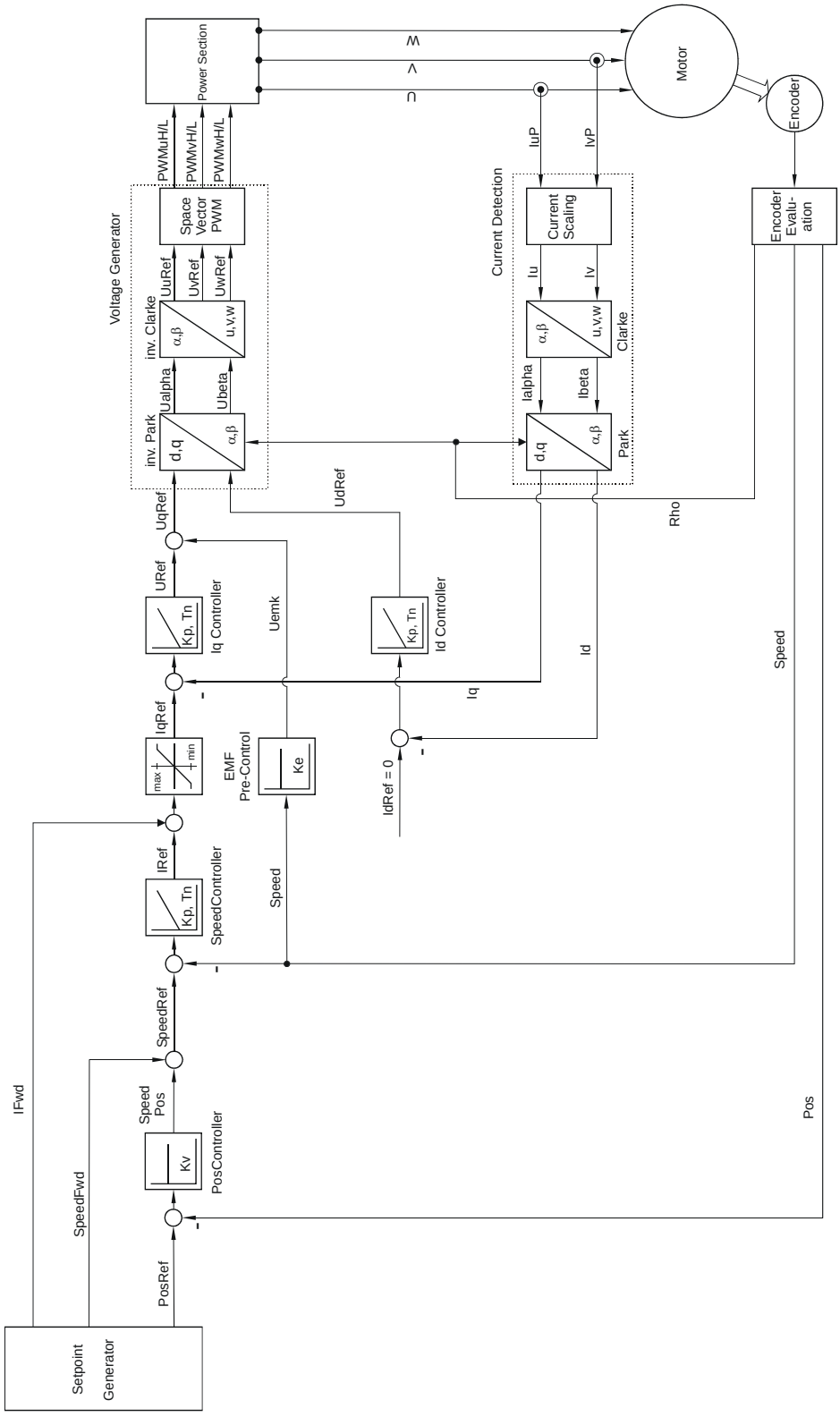


Fig.: 6: Block diagram of drive controller structure

Drive Controller Specification

All drive controllers can be parameterized through the control program.

Operating Principle	Remarks
Motor control (commutation)	Space vector modulation
PWM frequency	16 kHz
Current controller	
– Cycle time	62.5 µs
Speed controller	
– Cycle time	125 µs
– Current pre-control	adjustable
Position controller	
– Cycle time	250 µs
– Speed pre-control	adjustable
Position setpoint generator	
– Sine-square and linear acceleration and deceleration ramps	can be parameterized individually
– Setpoint output cycle (position feedback controller interpolation)	2 ms
Position sensing	
Resolver:	
– Resolution	12 bits per revolution
– Scan time	62.5 µs
Sine-cosine sensor (multi- and single-turn)**:**	
– Interface	HIPERFACE
– Resolution of absolute position	15 bits per revolution
– Resolution of velocity pickup	20 bits per revolution
– Scan time	62.5 µs

7 Description of Connections

7.1 Power Supply Connection

Specification of Terminal X1

- 4-pin spring tension terminal (type ZEC 1.5/ 4-ST-7.5 C2 R1,4; for printed circuit boards)
- Diameter of the cable apt for connecting: 0.25 ... 1.5 mm^2 (AWG 24 ... AWG 16)
- Bladed screw-driver: 0.6 x 3.5 x 100 mm^2

Specifications of Connecting Cable

- Cable size: 4 * 1.5 mm² (AWG 16(4))
- Material: Copper
- Temperature class: 60 °C
- Stripping length of cores: 6 mm
- Bootlace ferrules are not required.

Cable Shielding

- Not needed

Power Supply 3-Phase Connection		
Terminals X1 on the Amplifier Side	**Signal**	**Specification**
U1	L1	• AC 230 V between the power lines
V1	L2	
W1	L3	
PE	PE conductor	

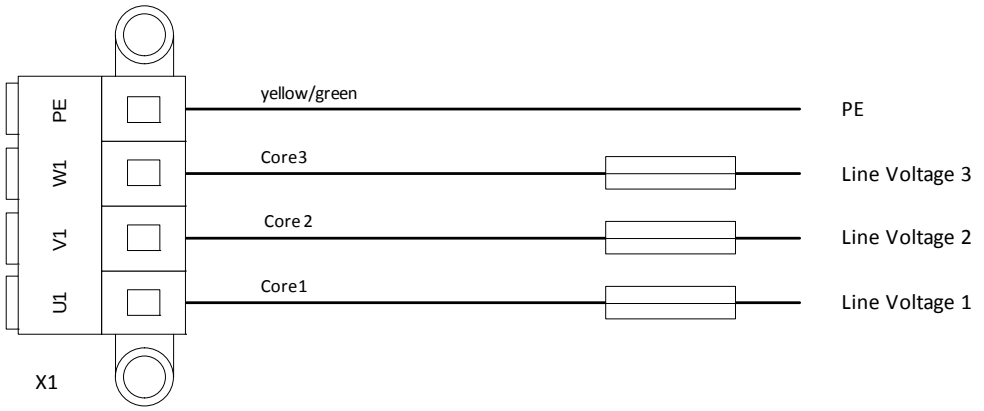


Fig.: 7: Connection of the 3-phase supply line

Power Supply 1-Phase Connection		
Terminals X1 on the Amplifier Side	**Signal**	**Specification**
U1	L	• AC 230 V between mains phase and neutral conductor
V1	N	
W1		
PE	PE conductor	

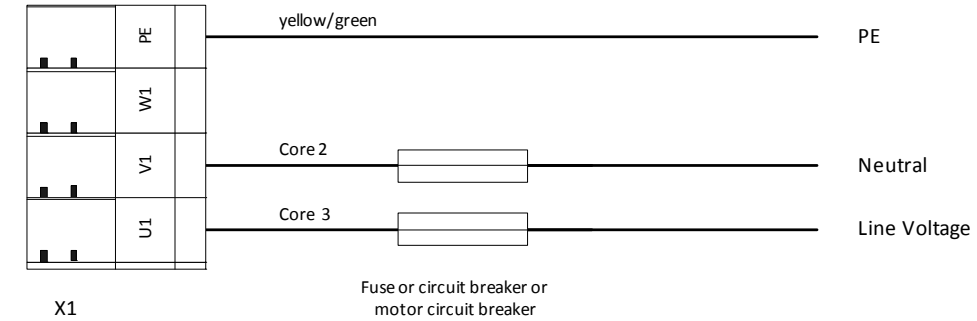


Fig.: 8: Connection of the 1-phase supply line

Note!

One-phase connection is only possible up to a motor rating of 1 kW.

7.2 Motor Connection

7.2.1 General Remarks

Important!

Measures to avoid malfunctions of the control system and the motor:

- Always connect brake lines to a separate power supply unit DC 24 V if brake and motor lines are run together in one bunch of cables, and are not separately shielded.

Important!

Measures to avoid oscillation and blocking of the motor:

- Avoid mixing-up of phase cables, resp. be sure to connect the phase cables according to pin assignment.

7.2.2 Assignment and Specifications

Specification of the Connector for Terminal X62

- 4-pin connector (type PC 4/ 4-ST-7.62)
- Diameter of the cable apt for connecting: 0.25 - 4.0 mm^2 (AWG 24 - AWG 12)
- Bladed screw-driver: 0.6 x 3.5 x 100 mm^2
- Stud torque for the screw clamping terminal:
  0.5 Nm (4.4 ... 5.3 lbf-inch)

Specification of the Motor Cable

- Cable size: 4 * 1.5 mm² (AWG 16(4))
- Material: Copper
- Temperature class: 60 °C
- Stripping length of cores: 6 mm
- Bootlace ferrules are recommended.

Cable Shielding

- Braided copper shield of 80 % coverage

Connection of the motor to the digital servo amplifier JetMove 206B-230 has to be done following the wiring diagram below. Connection of the brake is optional.

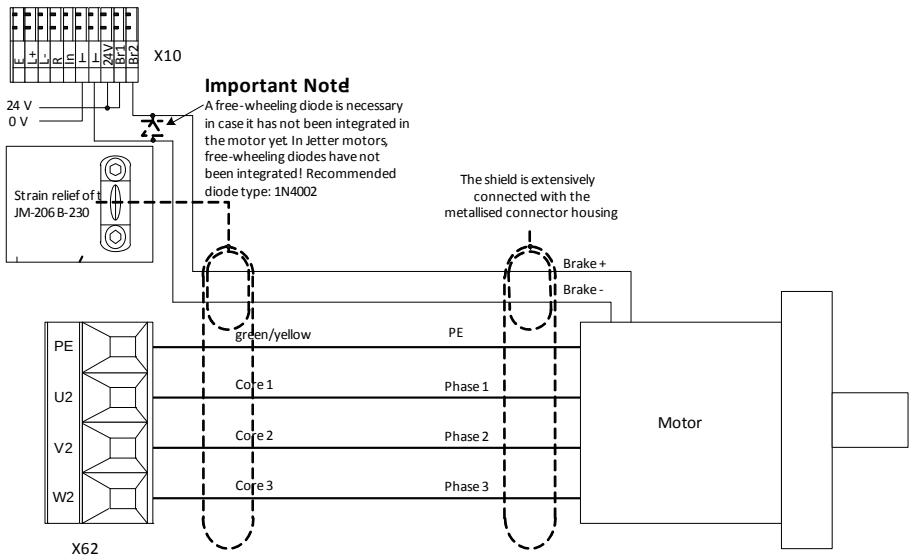


Fig.: 9: Connection of motor lines

7.2.3 Motor Power Cable with Mating Connector SC

Note!

The suitable mating connector SC (female connector) can be ordered from JetterAG by supplying the following particulars:

Item # 15100070	Motor mating connector for the Jetter motor series JH2, JH3, JH4, JH5, JL2, JL3, JL4, JK4, JK5, JK6, and for the Bautz motor series M25, M40, F50, F63, F80 without brake
Item # 15100105	Motor mating connector for the Jetter motor series JH2, JH3, JH4, JH5, JL2, JL3, JL4, JK4, JK5, JK6, and for the Bautz motor series M25, M40, F50, F63, F80 with brake

Note!

Motor power cable with mating connector SC (female connector) suitable for the Jetter motor series JL2, JL3, JL4, JK4, JK5, JK6, and for the Bautz motor series M25, M40, F50, F63, F80 can be ordered from Jetter AG by supplying the following particulars: It is confectioned with the matching motor mating connector and can be ordered by the following cable assy numbers:

Without brake:

Cable assy # 26.1

With brake:

Cable assy # 24.1

Mating Connector of the Motor (solder side)

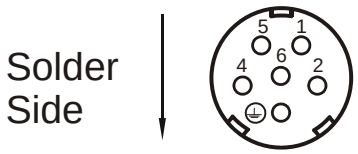
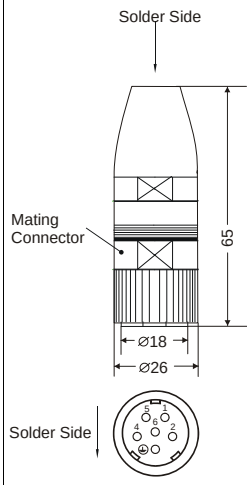
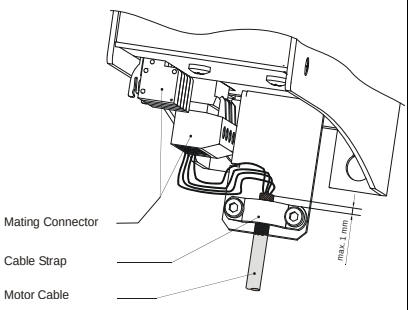
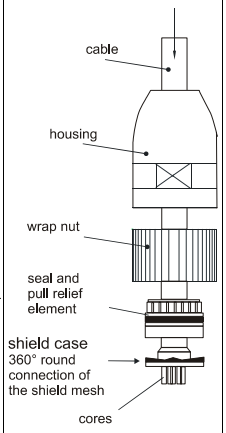


Fig.: 10: SC series mating connector of the motor (internal thread M23)

Cable Specification of the Motor Power Cable with Mating Connector SC for JetMove 206B-230

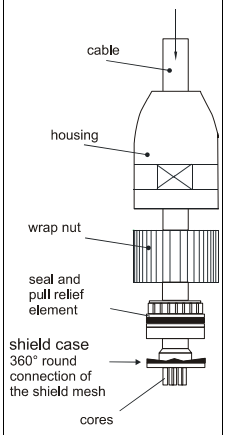
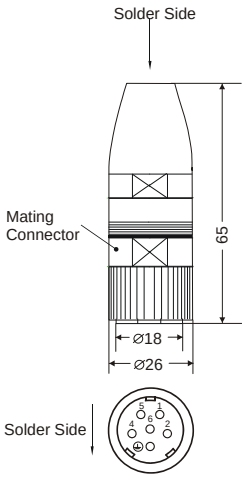
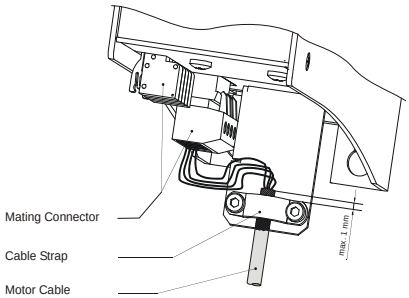
For connection without motor holding brake

<table>
<tr><th colspan="4">Motor Power Cable, Cable Assy # 26.1</th></tr>
<tr><th>Connecting Terminals of JetMove 206B-230</th><th colspan="2">Shielding</th><th>Mating Connector of the Motor (female, solder side)</th></tr>
<tr><td>(4 x 1.5 mm^2
(AWG 16(4))

The wires are equipped with wire end ferrules.</td><td colspan="2">Shielded, highly flexible 4-wire cable with PE (GND)</td><td rowspan="3"> 
</td></tr>
<tr><td colspan="2"> 
</td><td> 
</td></tr>
<tr><td colspan="2">Connect both sides of the shield with the greatest possible surface area!
Use metallized housing only!</td></tr>
<tr><th>Pin</th><th>Wire Number</th><th>Signal</th><th>Pin</th></tr>
<tr><td>X62.U2</td><td>1</td><td>Phase 1</td><td>1</td></tr>
<tr><td>X62.V2</td><td>2</td><td>Phase 2</td><td>5</td></tr>
<tr><td>X62.W2</td><td>3</td><td>Phase 3</td><td>2</td></tr>
<tr><td>X62.PE</td><td>yellow-green</td><td>PE conductor</td><td> </td></tr>
</table>

Dimensions of the motor mating connector are specified in millimeters.

For connection with motor holding brake

Motor Power Cable, Cable Assy # 24.1			
Connecting Terminals of JetMove 206B-230	**Shielding**		**Mating Connector of the Motor (female, solder side)**
($4 \times 1.5\ mm^2$ ($2 \times 1.5\ mm^2$)) (AWG 16(6)) The wires are equipped with wire end ferrules.	Highly flexible 6-wire cable with PE (GND) (separately shielded brake lines and all-over shielding)		
			
	Connect both sides of the shield with the greatest possible surface area! Use metallized housing only!		
Pin	**Wire Number**	**Signal**	**Pin**
X62.U2	1	Phase 1	1
X62.V2	2	Phase 2	5
X62.W2	3	Phase 3	2
X62.PE	yellow-green	PE conductor	⏚
X10.BRAKE2	5	Brake +	6
X10.GND	4	Brake -	4

Dimensions of the motor mating connector are specified in millimeters.

7.2.4 Motor Power Cable with Mating Connector SM

Note!

The suitable mating connector SM (female connector) can be ordered from Jetter AG by supplying the following particulars:

Item # 60860443 Motor mating connector JL5

Note!

The Jetter motor power cable with mating connector SM, matching the JL5 motor series, can be obtained from Jetter AG. It is confectioned with the matching motor mating connector and can be ordered by the following cable assy numbers:

Without brake:

Cable assy # 201

With brake:

Cable assy # 202

Mating Connector of the Motor (solder side)

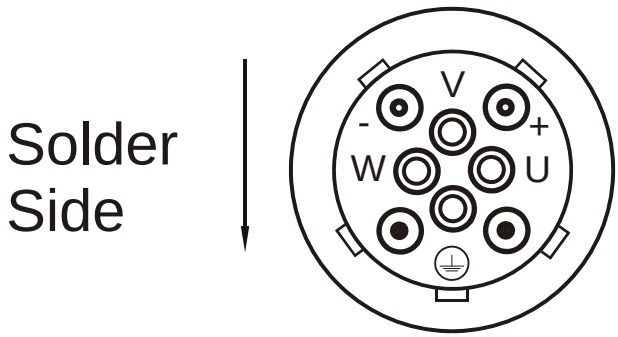
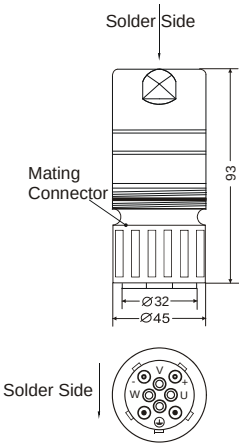
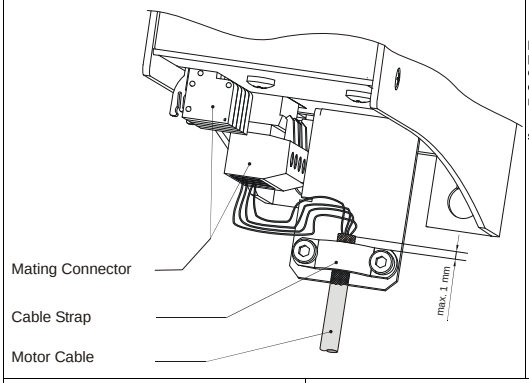


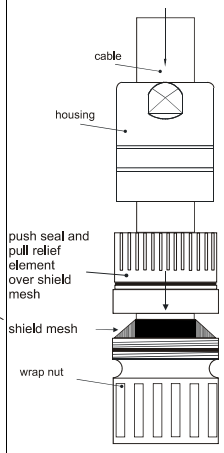
Fig.: 11: SM series mating connector of the motor (internal thread M40)

Cable Specification of the Motor Power Cable with Mating Connector SM for JetMove 206B-230

For connection without motor holding brake

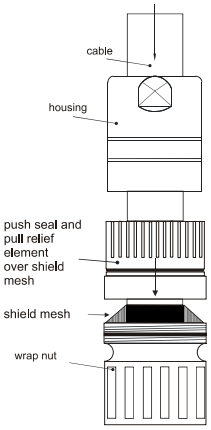
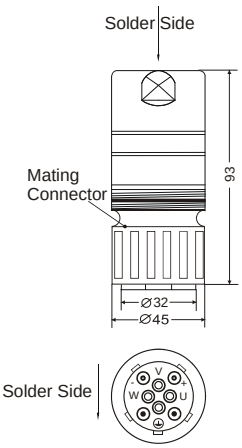
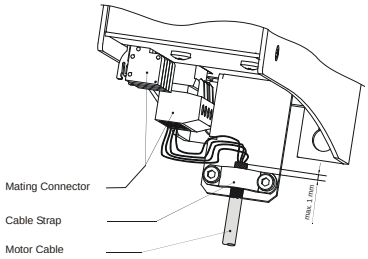
<table>
<tr><th colspan="4">Motor Power Cable, Cable Assy # 201</th></tr>
<tr><td>Connecting Terminals of JetMove 206B-230</td><td colspan="2">Shielding</td><td>Mating Connector of the Motor (female, solder side)</td></tr>
<tr><td>4 x 4 mm^2
(AWG 12(4)

The wires are equipped with wire end ferrules.</td><td colspan="2">Shielded, highly flexible 4-wire cable with PE (GND)</td><td rowspan="2"> 
</td></tr>
<tr><td colspan="3"> 


</td></tr>
<tr><td></td><td colspan="2">Connect both sides of the shield with the greatest possible surface area!
Use metallized housing only!</td><td></td></tr>
<tr><td>Pin</td><td>Wire Number</td><td>Signal</td><td>Pin</td></tr>
<tr><td>X62.U2</td><td>1</td><td>Phase 1</td><td>U</td></tr>
<tr><td>X62.V2</td><td>2</td><td>Phase 2</td><td>V</td></tr>
<tr><td>X62.W2</td><td>3</td><td>Phase 3</td><td>W</td></tr>
<tr><td>X62.PE</td><td>yellow-green</td><td>PE conductor</td><td> </td></tr>
</table>

Dimensions of the motor mating connector are specified in millimeters.

For connection with motor holding brake

Motor Power Cable, Cable Assy # 202			
Connecting Terminals of JetMove 206B-230	**Shielding**		**Mating Connector of the Motor (female, solder side)**
($4 \times 4\ mm^2$ + ($2 \times 0.5\ mm^2$)) (AWG 12(4) + AWG 20(2) The wires are equipped with wire end ferrules.	Highly flexible 6-wire cable with PE (GND) (separately shielded brake lines and all-over shielding)		
			
	Connect both sides of the shield with the greatest possible surface area! Use metallized housing only!		
Pin	**Wire Number**	**Signal**	**Pin**
X62.U2	1	Phase 1	U
X62.V2	2	Phase 2	V
X62.W2	3	Phase 3	W
X62.PE	yellow-green	PE conductor	⏚
X10.BRAKE2	5	Brake +	+
X10.GND	6	Brake -	-

Dimensions of the motor mating connector are specified in millimeters.

Note!

For cables having been manufactured before April 2005:
The signal "Brake -" is assigned to core # 4.

7.2.5 Connection Assignment of Terminal Box

Connection Assignment of Terminal Box*)		
Field Wiring Terminals of the Amplifier	**Motor Terminal Box - Terminal Assignment**	
X62.U2	Pin 1	Phase 1
X62.V2	Pin 2	Phase 2
X62.W2	Pin 3	Phase 3
X62.PE	Pin 4	Protective earth
X10.BRAKE2	Pin 7	Brake +
X10.GND	Pin 8	Brake -

*) alternative to motor connectors

7.3 Resolver Connection

7.3.1 Specification

Specification of Mating Connector X61 (ENCODER)

- 9-pin male SUB-D connector
- Metallized housing

Specification of the Resolver Cable

- Cable size: 4 * 2 * 0.14 mm² (AWG 26(8))
- Cores have to be shielded and twisted in pairs and have to be included in an overall shielding
- The shield must be connected to the connector housings on both ends of the cable with the greatest possible surface area.
- Material: Copper
- Temperature class: 60 °C
- Maximum cable length: 50 m

7.3.2 Resolver Cable with Mating Connector

Note!

The resolver respectively HIPERFACE mating connector of the Jetter motor series JL, JK and JH can be ordered from Jetter AG by supplying the following particulars:

Item # 15100069 Resolver / HIPERFACE

The complete resolver cable between the servo amplifier series JetMove 2xx and the Jetter motor series JL, JK and JH can be obtained from Jetter AG. It can be ordered by supplying the following cable assy number:

Cable assy # 23 For the servo amplifier series JetMove 2xx

Mating connector of the resolver (solder side)

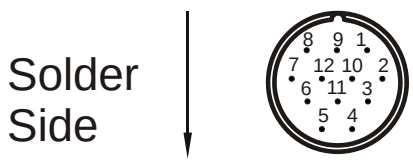
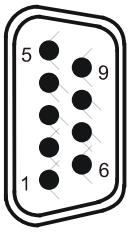
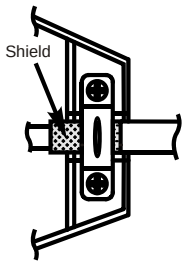
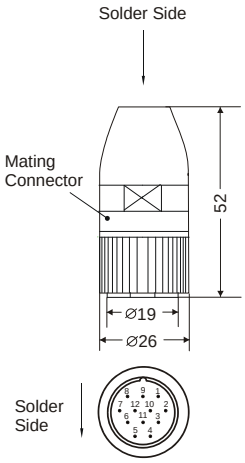


Fig.: 12: RC series mating connector of the resolver (internal thread M23)

Resolver Cable of Cable Assy # 23

JetMove 2xx (SUB-D male connector X61)	Shielding		Motor (Resolver) (female, solder side)
 Attaching screws must have a metric thread!	 Connect shield with the greatest possible surface area! Use metallized housing only!		
Pin	**Signal**	**Core Color**	**Pin**
8	Cosine +	red	1
3	Cosine -	blue	2
2	Sine -	amber	3
7	Sine +	green	4
1	R1R (exciter winding +)	pink	5
6	R2L (exciter winding -)	gray	6
9	Th1 (Thermal sensor)	white	7
4	Th2 (Thermal sensor)	brown	8
-	unassigned	-	9 - 12

Dimensions of the resolver mating connector are specified in millimeters.

7.4 HIPERFACE Connection

7.4.1 Specification

Specification of Mating Connector X61 (ENCODER)

- 9-pin male SUB-D connector
- Metallized enclosure

HIPERFACE Cable Specification

- Cable size: 4 * 2 * 0.14 mm² + 2 * 0.5 mm² (AWG 26(8) + AWG 20(2))
  2 * 0.5 mm² (AWG 20(2)) must be used for the power supply unit and for GND.
- The cables have to be twisted in pairs and included in an overall shielding.
- The following signal lines have to be twisted in pairs:
  Sine + and reference sine
  Cosine + and reference cosine
  DATA - and DATA +
  0 V and power supply
- The shield must be connected to the connector housings on both ends of the cable with the greatest possible surface area.
- Material: Copper
- Temperature class: 60 °C
- Maximum cable length: 50 m

7.4.2 HIPERFACE Cable with Mating Connector

Note!

The resolver respectively HIPERFACE mating connector of the Jetter motor series JL, JK and JH can be ordered from Jetter AG by supplying the following particulars:

Item # 15100069	Resolver / HIPERFACE

The complete HIPERFACE cable connecting the servo amplifier series JetMove 2xx and the Jetter motor series JL, JK and JH can be obtained from Jetter AG. It can be ordered by submitting the following cable specifications and the respective cable length in cm:

KAY_0723-xxxx	For the servo amplifier series JetMove 2xx

HIPERFACE mating connector (solder side)

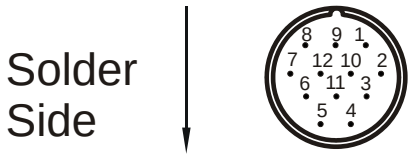
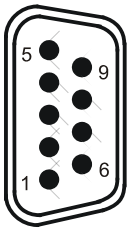
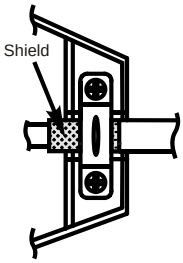
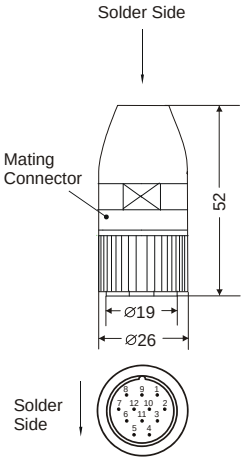


Fig.: 13: RC series HIPERFACE mating connector (internal thread M23)

HIPERFACE Cable of KAY_0723-xxxx

JetMove 2xx (SUB-D male connector X61)	Shielding		Motor (HIPERFACE) (female, solder side)
 Attaching screws must have a metric thread!	 Connect shield with the greatest possible surface area! Use metallized housing only!		
Pin	**Signal**	**Core Color**	**Pin**
-	unassigned	-	1
-	unassigned	-	2
7	Sine +	white	3
2	Reference sine	brown	4
8	Cosine +	green	5
3	Reference cosine	amber	6
6	DATA - (RS-485)	gray	7
1	DATA + (RS-485)	pink	8
4	0 V	blue	9 *)
5	Power supply (7 through 12 volts)	red	10
9	Thermal sensor	black	11
	Thermal sensor	-	12 *)

*) Pin 9 and pin 12 are short-circuited.
Dimensions of the HIPERFACE mating connector are specified in millimeters.

7.5 Sin-Cos Encoder Connection

7.5.1 Adapter

An adapter is needed for connecting a sin-cos encoder. This adapter can be obtained from Jetter AG by the following specification:

JM-200-ENC-ADAP (item # 10000430) 10000430)

Another 9-pin SUB-D connector of the encoder cable can be connected to this adapter. Further, this adapter allows for connecting an individual temperature sensor of the motor, as normally these signals are not conducted via the encoder cable, if a sin-cos encoder is used.

7.5.2 Specification

Specifications of the Mating Connector for X61 (ENCODER)

- 9-pin male SUB-D connector
- Metallized enclosure

Sin-Cos Encoder Cable Specifications

- Cable size: 2 * 2 * 0.14 mm² + 2 * 0.5 mm² (AWG 26(4) + AWG 20(2)), if there is no index signal.
- Cable size: 3 * 2 * 0.14 mm² + 2 * 0.5 mm² (AWG 26(6) + AWG 20(2)), if there is no index signal.
- 2 * 0.5 mm² (AWG 20(2)) must be used for the power supply unit and for GND.
- Cores have to be twisted in pairs and have to be included in an overall shielding.
- The following signal lines have to be twisted in pairs:
  Sine + and reference sine
  Cosine + and reference cosine
  Index + and reference index
  0 V and power supply
- The shield must be connected to the connector housings on both ends of the cable with the greatest possible surface area.
- Material: Copper
- Temperature class: 60 °C
- Max. cable length: 100 m

7.5.3 Connection Diagram

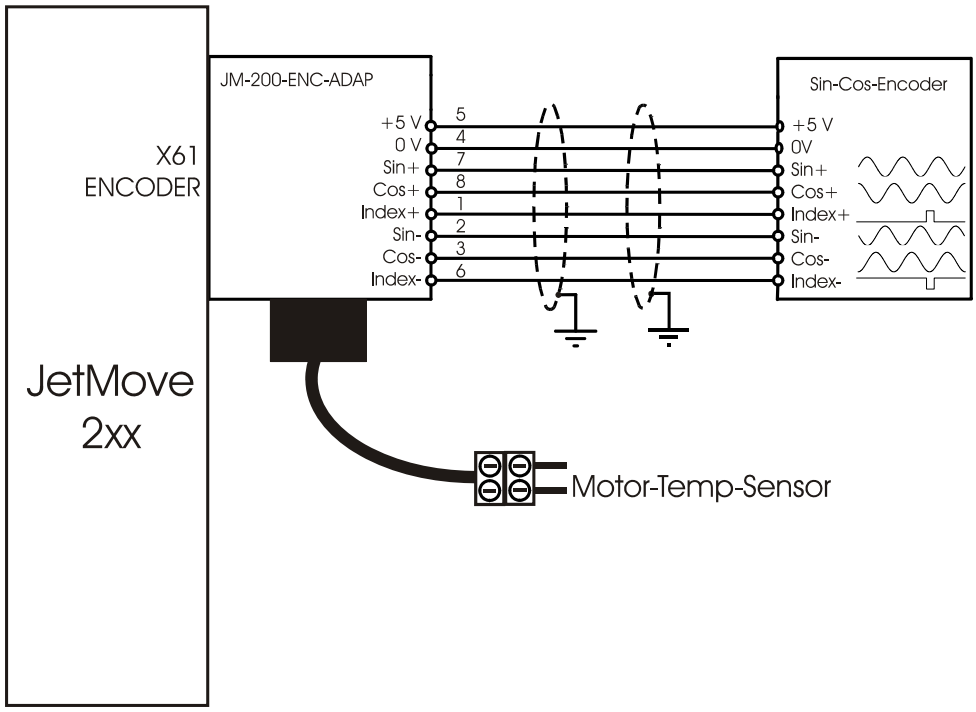
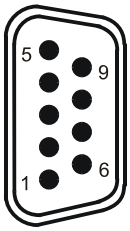
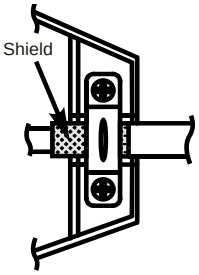


Fig.: 14: Sin-cos encoder connection with adapter

Sin-Cos Encoder Cable	
JetMove 2xx (SUB-D connector X61) with Adapter JM-200-ENC-ADAP	**Shielding**
	
Attaching screws must have a metric thread!	Connect shield with the greatest possible surface area! Use metallized housing only!
Pin	**Signal**
7	Sine +
2	Reference sine
8	Cosine +
3	Reference cosine
1	Index +
6	Reference index
4	0 V
5	Power supply (5 V - 100 mA max.)
9	unassigned

Important!

To be considered before connecting sin-cos encoders

- If a sin-cos encoder is to be used, after applying the logic power supply to the JetMove 2xx and before the first enable, commutation finding **always** has to be carried out.
  If this is not considered, the motor might move uncontrollably.

- The counting direction of the position in the JetMove 2xx is reversed in the following cases:
  Case 1: The signal sine+ is exchanged with the signal cosine+, and the signal reference-sine is exchanged with the signal reference cosine.
  Case 2: The signal sine is exchanged with the signal reference sine
  Case 3: The signal cosine is exchanged with the signal reference cosine

- Due to conduction loss, a voltage smaller than 5 V might reach the encoder. If necessary, the encoder supply cords have to have a greater diameter.

- If a motor temperature sensor is not used, the inputs have to be short-circuited at the adapter, so the JetMove 2xx will not give an error message.

7.6 Digital Inputs, Logic Power Supply

Specification of Terminal X10

- 10-pin spring tension terminal (type ZEC 1,0/10-ST-3,5)
- Diameter of the cable apt for connecting: 0.2 ... 1 mm^2 (AWG 24 ... AWG 16) with bootlace ferrules in a plastic sleeve: 0.25 - 0.75 mm^2 (AWG 24 - AWG 18)
- Bladed screw-driver: 0.4 x 2.5 mm

Digitale Inputs, Logic Power Supply			
Wiring Terminal X10 at the Amplifier	**Signal**	**Operating Principle**	**Specification**
ENABLE	Hardware enable for the power supply of the motor (Input)	• At this input, a high signal is necessary for power supply of the motor (This signal must have been applied before carrying out the software enable). • A low signal de-energizes the motor immediately.	• DC 24 V • 7.5 mA max. • Operating point: < 6 V low, > 15 V high
REF	Reference switch (Input)	• Depending on the parameter setting, this input is used for reference run.	• DC 24 V • 7.5 mA max. • Operating point: < 6 V low, > 15 V high NC or NO contact
LIMIT +	Positive limit switch (input)	• Depending on the parameter setting, this input is used as a positive limit switch.	• DC 24 V • 7.5 mA max. • Operating point: < 6 V low, > 15 V high NC or NO contact
LIMIT -	Negative limit switch (input)	• Depending on the parameter setting, this input is used as a negative limit switch.	• DC 24 V • 7.5 mA max. • Operating point: < 6 V low, > 15 V high NC or NO contact

INPUT	Digital input	• Depending on the parameter setting, this input can be used for quick stop, position capture or referencing without stop.	• DC 24 V • 7.5 mA max. • Operating point: < 6 V low, > 15 V high
⊥	Common ground		GND*) for all inputs and supply of the logic
⊥	Common ground		GND*) for all inputs and supply of the logic
DC 24 V	Voltage supply of processor logics		DC 20 ... 30 V (I < 0.6 A)
BRAKE 1	Braking relay contact Br1	Relay contact for motor holding brake The relay can be operated either by the control program or by the firmware of the JetMove 206B-230 at release of the motor current. **Important Note!** A free-wheeling diode is necessary in case it has not been integrated in the motor yet. In Jetter motors, free-wheeling diodes have not been integrated! Recommended diode type: 1N4002	$V_{max.}$ = DC 30 V $I_{max.}$ = DC 2 A N/O These connections are only for devices having got the same reference to ground as the power supply of the logic.
BRAKE 2	Braking relay contact Br2		

*) is connected to the ground of the control system.

7.7 Jetter System Bus

By means of the Jetter system bus, the JetMove 206B-230 is interlinked with the controller, additional JetMove amplifiers, or Jetter peripheral modules. The system bus input BUS-IN is a 9-pin SUB-D male connector, and the system bus output BUS-OUT is a 9-pin SUB-D female connector.

7.7.1 Specifications of the Jetter System Bus Cable

Specification of Connectors

On the BUS-OUT (X19) side
- 9-pin male SUB-D connector
- Metallized enclosure

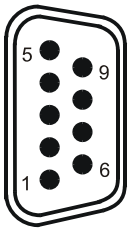
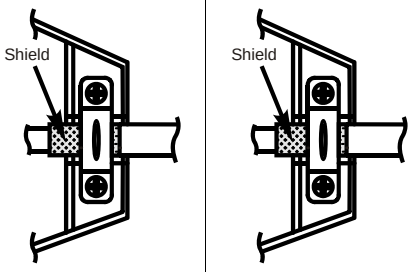
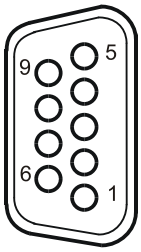
On the BUS-IN (X18) side
- 9-pin female SUB-D connector
- Metallized enclosure

System Bus Cable Specification

The following minimum requirements apply to the manufacture of the system bus cable:

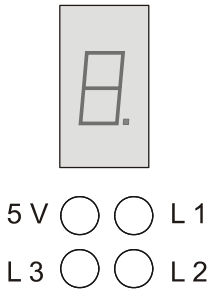
Technical Data of the System Bus Cable		
Operating Principle	**Description**	
Core cross-sectional area	1 MBaud:	0.25 - 0.34 mm^2
	500 kBaud:	0.34 - 0.50 mm^2
	250 kBaud:	0.34 - 0.60 mm^2
	125 kBaud:	0.50 - 0.60 mm^2
Capacity of the cable	60 pF/m max.	
Resistivity	1 MBaud:	Maximum 70 Ω/km
	500 kBaud:	Maximum 60 Ω/km
	250 kBaud:	Maximum 60 Ω/km
	125 kBaud:	Maximum 60 Ω/km
Number of cores	5	
Shielding	Complete shielding, no paired shielding	
Twisting	Core pairs CL and CH must be twisted.	

Allowed Cable Lengths			
Baud Rate	**Max. Cable Length**	**Max. Tap Line Length**	**Max. Overall Tap Line Length**
1 MBaud	30 m	0.3 m	3 m
500 kBaud	100 m	1 m	39 m
250 kBaud	200 m	3 m	78 m
125 kBaud	200 m	-	-

System Bus Cable of Cable Assy # 530		
	Shielding	
		
BUS-OUT	Connect shield with the greatest possible surface area! Use metallized housing only!	**BUS-IN**
Pin	**Signal**	**Pin**
1	CMODE0	1
2	CL	2
3	GND	3
4	CMODE1	4
5	TERM	5
6	Unassigned	6
7	CH	7
8	Unassigned	8
9	Do not connect	9

8 Status Monitoring

The output stage LEDs indicate the operating status of the digital servo amplifier.



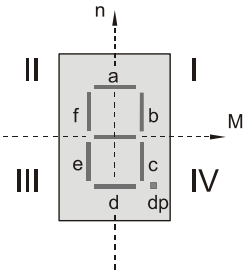
JetMove 206B-230 - LEDs		
LED	**Color**	**Meaning**
5V	green	Logic module voltage is OK.
L1	yellow	Axis is standing still (speed = 0)
L2	yellow	A voltage of 24 V is applied to the input of the positive limit switch (LIMIT+).
L3	yellow	A voltage of 24 V is applied to the input of the negative limit switch (LIMIT-).

Note!

The seven-segment display of the output stage indicates the operating and fault conditions of the digital servo amplifier JetMove 206B-230. The various display modes are set by the Motion Setup. Mode 0 (default) is used for normal operation and mode 1 for commissioning.

JetMove 206B-230 - Seven-Segment Display Mode 0: Normal Operation		
Display	**State**	**Meaning**
0	NOT READY TO BE SWITCHED ON	Initialization of amplifier functions
1	SWITCH-ON INHIBIT	Initialization completed. Safe state achieved after initialization and acknowledgement of errors. The drive controller can be switched on.
2	READY TO BE SWITCHED ON	Drive controller has been disabled by software command. The drive controller can be switched on.
3	SWITCHED ON	DC link monitoring is activated.
4	OPERATION_ENABLED	The drive controller is enabled.

JetMove 206B-230 - Seven-Segment Display Mode 0: Normal Operation		
7	QUICK STOP ACTIVATED	A quick stop has been activated. The drive is being decelerated to n = 0 and then locked.
E	ERROR REAKTION IS ACTIVATED	An error has been recognized. An adjustable error reaction may be active.
F	MALFUNCTION	The drive controller is locked, error can be acknowledged.
F X. X.	ERROR NUMBER	Error with number X. X. has occurred.
.	Flashing dot	Warning activated
0.	Flashing "ZERO"	Boot sector activated
C.	Flashing "C"	OS flash gets deleted.
E.	Flashing "E"	OS flash gets deleted.
L.	Flashing "L"	OS loader gets loaded.
P.	Flashing "P"	OS is transferred to the flash memory.
U.	Flashing "U"	The boot sector waits for OS update.



JetMove 206B-230 - Seven-Segment Display Mode 1: Commissioning		
Display	**Meaning**	**Meaning**
g	$\mathbf{n}_{\text{as-is value}}$ < 0.5 % $\mathbf{n}_{\text{max.}}$	--
b	**M > 0**, **n > 0** --> Quadrant I	Mode of operation - Motor
c	**M < 0**, **n > 0** --> Quadrant II	Mode of operation - Generator
e	**M < 0**, **n < 0** --> Quadrant III	Mode of operation - Motor
f	**M > 0**, **n < 0** --> Quadrant IV	Mode of operation - Generator
a	Positive current limit has been reached.	--
d	Negative current limit has been reached.	--

9 Diagnostics

9.1 Fault Messages

Note!

In the case of a fault message, the letter "F" and two successive numbers appear on the seven-segment display every second.

Fault Message Table JetMove 206B-230				
Error Number	**Type of Error**	**Description**	**Reaction**	**Remedy**
F 00	Hardware error	Internal hardware defect	– Immediate controller disable	– Separate the drive controller from the power lines. – Return the amplifier for repair.
F 01	Internal voltage supply error	One or more power supply voltages are beyond their limits.	– Immediate controller disable	– Separate the drive controller from the power lines. – Return the amplifier for repair.
F 02	Mains phase error (is only active in case of a 3-phase connection)	Failure of one of the mains phases.	– Immediate controller disable	– Check fuses and wiring. – Acknowledge failure.
F 03	Motor cable breakage	The motor cable is broken. Please be careful: The motor cable is tested when the drive controller is enabled for the first time.	– Immediate controller disable	– Check the motor cable connections. – Acknowledge failure.
F 04	Overvoltage in the DC link	A DC link voltage of > 480 V is detected.	– Immediate controller disable	– Check input voltage supply. – If the motor is used as generator, reduce the regenerating power. – Acknowledge failure.

Fault Message Table JetMove 206B-230				
Error Number	**Type of Error**	**Description**	**Reaction**	**Remedy**
F 05	Over-current	The output current is greater than 2.5 x the rated current.	– Immediate controller disable	– Check cable and motor for a short circuit. – Check current control parameters. If necessary, correct parameters. – Acknowledge failure.
F 06	Ballast resistor overload	The ballast resistor is overloaded.	– Immediate controller disable	– Let the amplifier cool down. – After cooling down, acknowledge failure. – Reduce regeneration power.
F 07	Amplifier overtemperature	The amplifier has reached the maximum temperature.	– Immediate controller disable	– Let the amplifier cool down. – After cooling down, acknowledge failure. – Reduce power of the motion system.
F 08	Motor overtemperature	The motor has reached the maximum temperature.	– Immediate controller disable	– Let the motor cool down. – After cooling down, acknowledge failure. – Reduce the power of the drive.
F 09	Encoder failure	Encoder breakage or initialization error	– Immediate controller disable	– For extended diagnostics purposes use Motion Setup. – Check the encoder line and all plug-in connections. – Acknowledge failure.
F 10	Overspeed	The actual shaft speed has exceeded a value of 1.25 x maximum speed.	– Immediate controller disable	– Check motor and encoder connections. – Check speed controller parameters. If necessary, modify parameters. – Acknowledge failure.
F 11	Current overrange	A current temporarily too high is detected.	– Immediate controller disable	– Reduce K_p of the current controller by 10 to 20 %. – Acknowledge failure

Fault Message Table JetMove 206B-230				
Error Number	**Type of Error**	**Description**	**Reaction**	**Remedy**
F 12	Ground fault	One or several phases of the motor cable or inside the motor have been short-circuited to earth.	– Immediate controller disable	– Check the motor cable and the motor. – Acknowledge failure.
F 13 (combined with F00)	Internal checksum error	An internal checksum error has occurred.	– Immediate controller disable	– Switch the 24 V supply off and on again. – If the error occurs repeatedly, return the amplifier for repair.
F 14 (combined with F 00)	Internal communication error	An internal communication error has occurred.	– Immediate controller disable	– Switch the 24 V supply off and on again. – If the error occurs repeatedly, return the amplifier for repair.
F 15	The hardware enable is missing.	The software enable is given without a hardware enable.	– Immediate controller disable	– Disable the drive by means of the software. – Acknowledge failure.
F16	Power input overcurrent	The current at the power input is too high.	– Immediate controller disable	– Check input voltage. – Reduce mechanical power of the motor. – Acknowledge failure.
F 17	Trip of software limit switch is activated.	Actual position is outside the programmed range and a software limit switch has tripped.	– Stop at max. current (max. torque).	– Check target position. – Acknowledge failure. – Return the axis to a position within the software travel limits (monitoring of software limit switches is re-enabled automatically at entering this range).
F 18	The trip of hardware limit switch is activated.	One hardware limit switch has tripped.	– Stop at max. current (max. torque).	– Check target position. – Check reference position. – Acknowledge failure. – Return the axis to a position within the machine travel limits (monitoring of hardware limit switches is re-enabled automatically at entering this range).

Fault Message Table JetMove 206B-230				
Error Number	**Type of Error**	**Description**	**Reaction**	**Remedy**
F 20	Undervoltage in the DC link	The DC link voltage is less than the set minimum value.	– Stop with emergency deceleration ramp.	– Check the supply voltage. – Check the parameter "U_{ZK} min. trip". – Acknowledge failure.
F 21	Overvoltage of the DC link voltage	The DC link voltage has exceeded the set maximum value.	– Stop with emergency deceleration ramp.	– Check the supply voltage. – In generator operation, reduce braking power. – Acknowledge failure.
F 22	The drive is blocked.	The drive could not overcome the n = 0 threshold within the time limit specified by the parameter "blocking-triping time"	– Immediate controller disable	– Eliminate the cause of blocking. – Acknowledge failure.
F 23	Tracking error	The tracking error has exceeded the limit defined in the parameter "tracking error limit" for the time specified in "tracking window time".	– Stop with emergency deceleration ramp.	– Check the drive mechanism. – Check steepness of acceleration/ deceleration ramps and amplifier parameters in relation to the parameters "tracking error limit" and "tracking error window time". – Acknowledge failure.
F 24 (combined with F 01)	Error in 24 V supply voltage	The external 24 V supply was lower than 18 V.	– Immediate controller disable	– Check external power supply. – Acknowledge failure.
F 25 - F 27 (combined with F 01)	Internal power supply error	One or more internal supply voltages have fallen below their limits.	– Immediate controller disable	– Note the fault number. – Return the amplifier for repair.
F 29	The mains power is too high.	The average mains power of the 230 V supply was too high.	– Immediate controller disable	– Acknowledge failure. – Reduce the average load of the motor.

Fault Message Table JetMove 206B-230				
Error Number	**Type of Error**	**Description**	**Reaction**	**Remedy**
F 30	I²t error	The average power loss of the motor is greater than the max. value configured by nominal motor current, overload factor and motor time constant. See "I²t Calculation" on page 39	– Immediate controller disable	– Let the motor cool down. – Acknowledge failure. – Check the configuration of nominal motor current, overload factor and motor time constant. – Reduce the average load of the motor.
F 31	Motor overload protection according to UL	The average motor power loss was higher than defined according to UL. See chapter 5.2.3 "Motor Overload Calculation to UL", page 41	– Immediate controller disable	– Let the motor cool down. – Acknowledge failure. – Reduce the average load of the motor.
F 38	Asymmetric encoder signal	The amplitudes of the analog sine-cosine signals are not identical.	– Immediate controller disable	– Check wiring or encoder signals. – Acknowledge failure.
F 39	Error at commutation finding	Measuring the commutation offset could not be completed with results being guaranteed.	– Immediate controller disable	– Check parametering. – Check wiring or encoder signal. – Acknowledge failure.
F 42	Malfunctioning of encoder 2 (only for the option CNT)	Encoder breakage or initialization error	– Immediate controller disable	– Check the encoder line and all plug-in connections. – Acknowledge failure.

9.2 WARNINGS

If the dot in the seven-segment display is flashing, one or several warnings have been recognized. Please check in the Motion Setup or by issuing the motion instructions in the controller program which warning is active.

10 Connection Diagrams

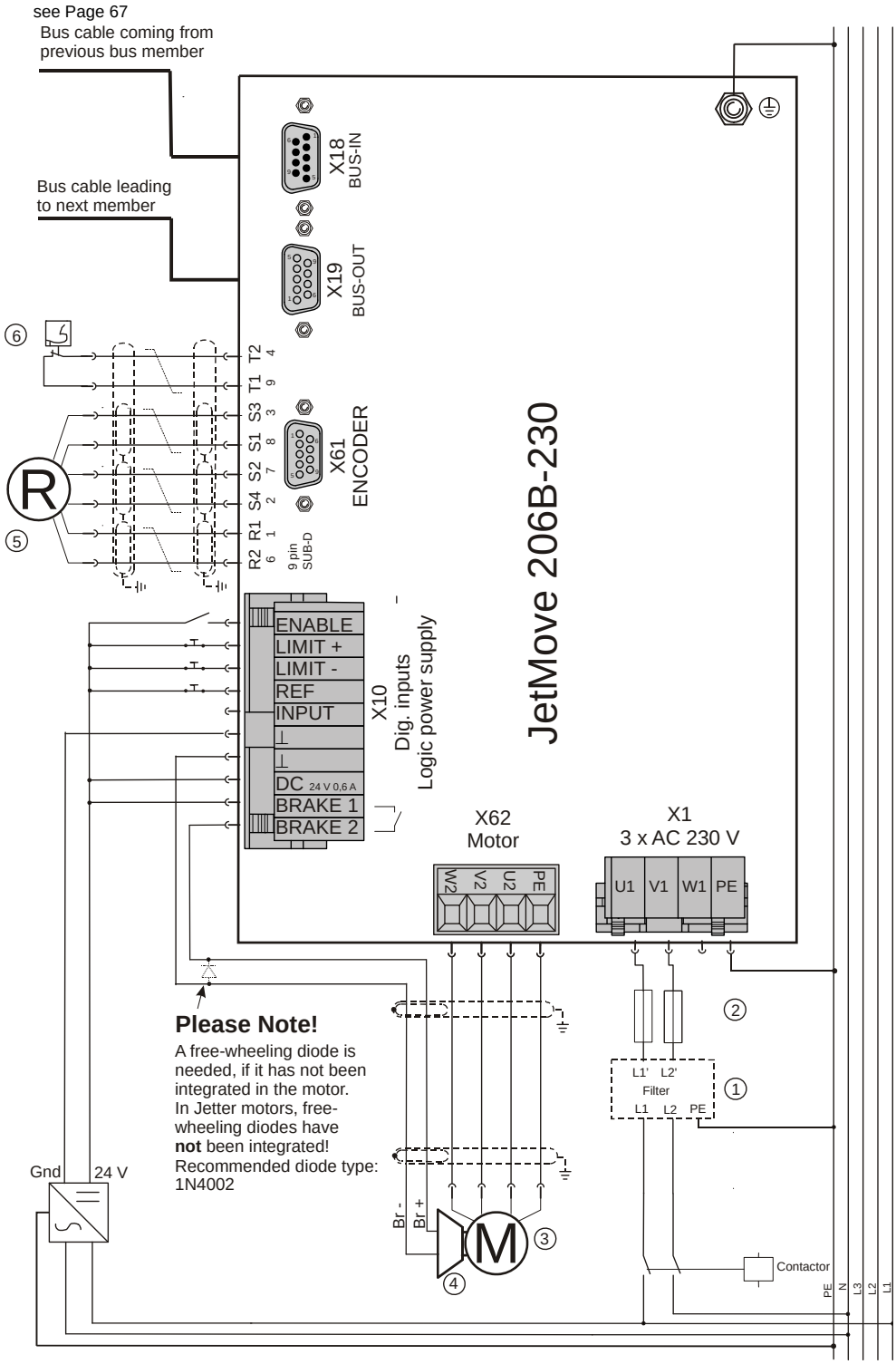


Fig.: 15: Connection diagram JetMove 206B-230, 1-phase connection, type of position transducer: Resolver

See also chapter 7 "Description of Connections", page 45.

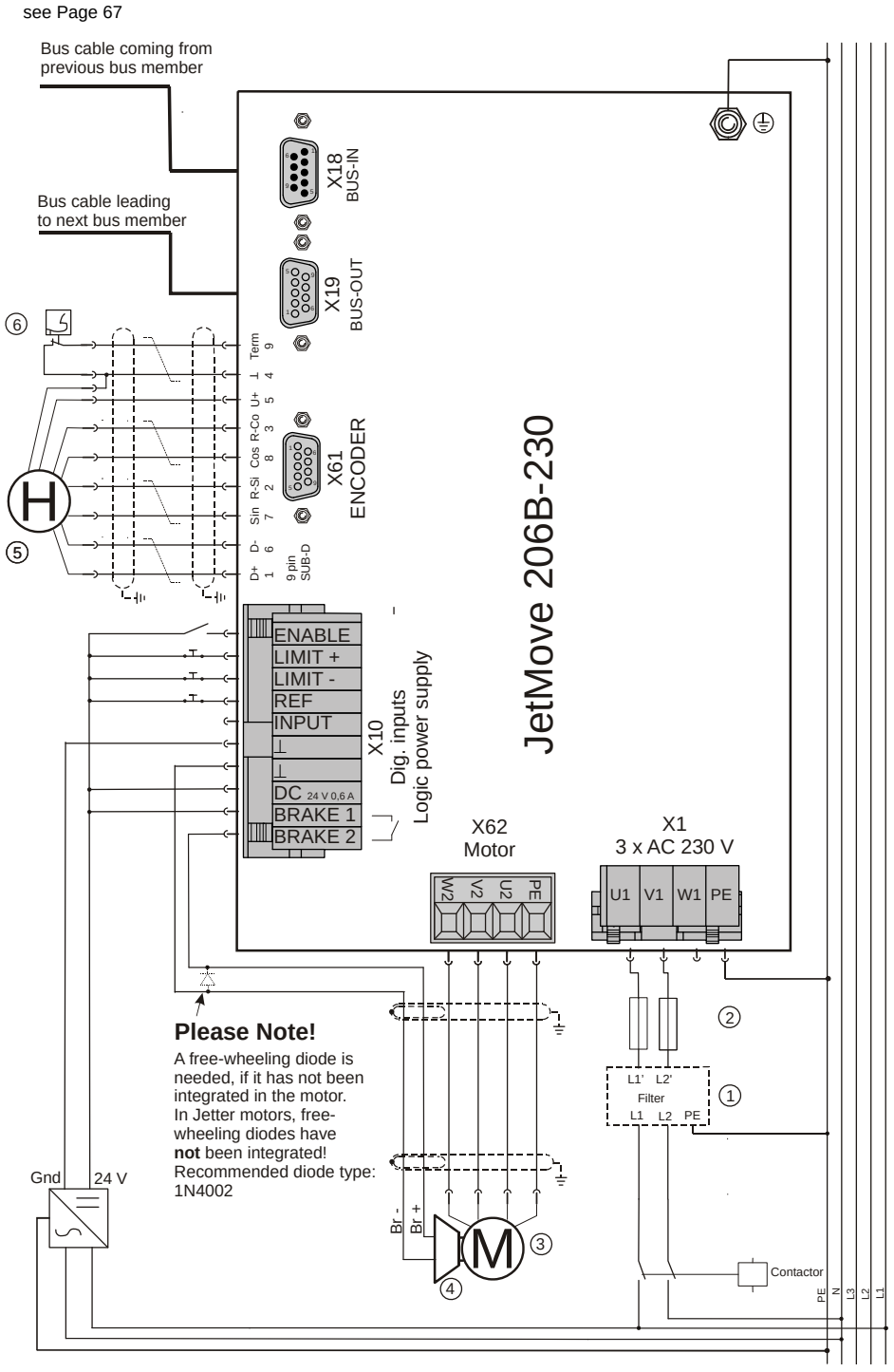


Fig.: 16: Connection diagram JetMove 206B-230, 1-phase connection, type of position transducer: HIPERFACE

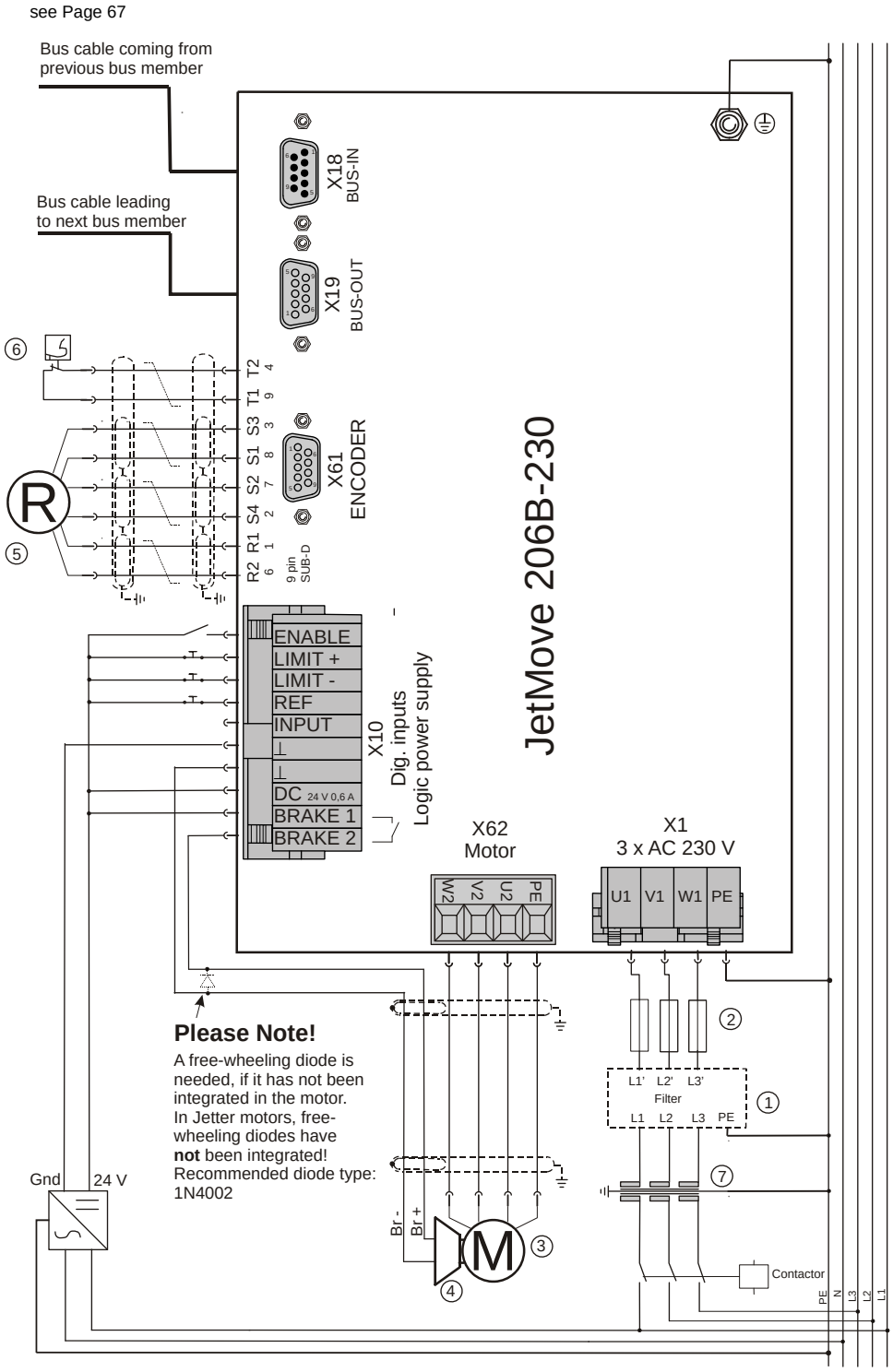


Fig.: 17: Connection diagram JetMove 206B-230, 3-phase connection, type of position transducer: Resolver

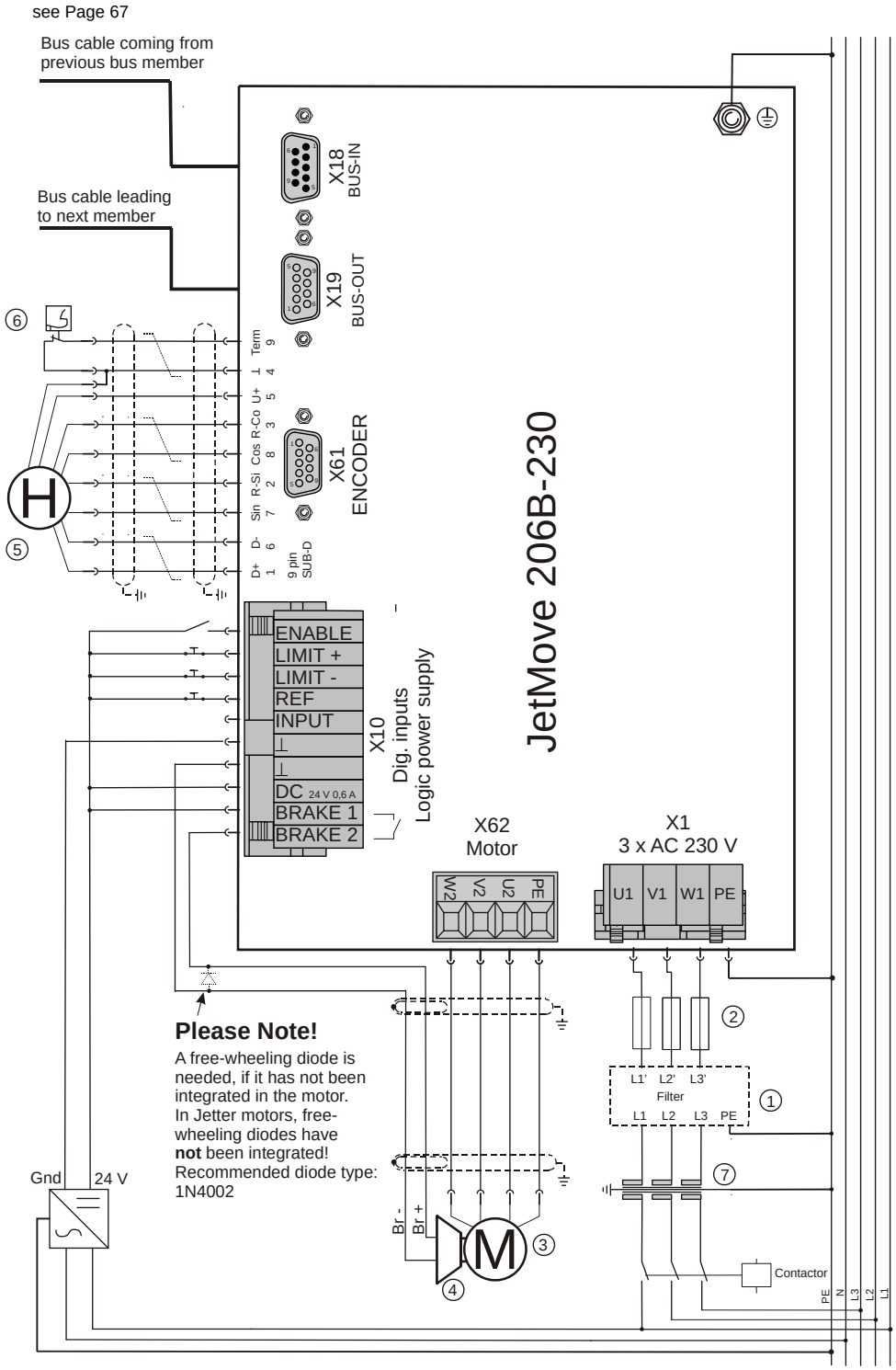


Fig.: 18: Connection diagram JetMove 206B-230, 3-phase connection, type of position transducer: HIPERFACE

Key to the wiring diagrams_

1	Line filter (optional) (refer to "Line filter" on page 36)
2	Mains protection (refer to "Overload protection" on page 35)
3	Motor
4	Motor holding brake (option)
5	Position transducer (resolver or HIPERFACE encoder)
6	Motor overtemperature protection
7	Isolating transformer or autotransformer

11 Analog Input (Option)

11.1 Operating Principle

For the digital servo amplifier JetMove 206B-230, an optional integrated analog input card can be ordered (article designation of the device: JM-206B-230...-IA1). This card supplies an analog input of a 12-bit resolution. The converted value of the measured voltage can be read by a register of the JetMove in the PLC program or processed by the firmware of the JetMove in an additional controller. This way it is possible for example, to realize a pressure control loop in which the motor controlled by the JetMove generates the pressure. A pressure sensor in the machine is connected to the analog input of the JetMove to deliver the actual pressure value for the control loop.

11.2 Technical Data

Technical Data of the Analog Input	
Connection	SUB-D connector (male) at the device
Voltage range	0 ... 10 V
Input current	1.4 mA max.
Resolution	12 bits
Value range	0 ... 32767 (resolution in steps of 8)
Electrical isolation	None
Accuracy Zero error Gain error	 max. ± 5 LSB (± 40 values) corresponds to ± 12.2 mV max. ± 10 LSB (± 80 values) corresponds to ± 24.4 mV

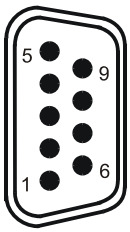
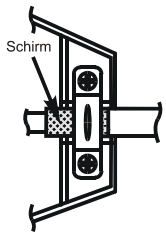
11.3 Description of Connections

Specification of Mating Connector for X72

- 9-pin female SUB-D connector
- Metallized housing

Specification of the Cable leading to the Analog Input

- Cable size: 2 * 0.14 mm² min. (AWG 26(2))
- Cores have to be twisted and entirely shielded.
- The shield must be connected to the connector housings on both ends of the cable with the greatest possible surface area.
- Material: Copper
- Temperature class: 60 °C

Pin Assignment of the Analog Input	
	Shielding
	
X72	Connect shield with the greatest possible surface area! Use metallized housing only!
Pin	**Signal**
1	Analog signal (0 - 10 V to pin 6)
6 - 9	Analog GND (connected to earth in the device)
2 - 5	Do not use

12 Ethernet Interface (Option)

12.1 Operating Principle

For the digital servo amplifier JetMove 206B-230, an optional integrated Ethernet interface can be ordered (article designation of the device: JM-206B-230...-OEM). This allows for the JetMove 206B-230 to be addressed by the controller via Ethernet instead of system bus.

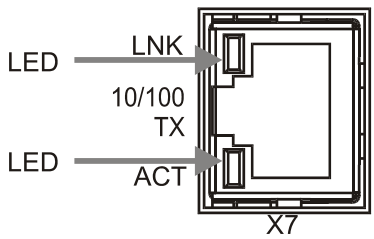
Functional Equipment	
1 Ethernet interface	10/100 MBit/s, TX
10-pin DIP switch for the lower 8 bits of the IP address and of various operating modes	RUN / STOP / LOAD
LED for status indication	RUN / ERR

12.2 Description of Connections

The digital servo amplifier JetMove 206B-230...-OEM is connected with the Ethernet by a RJ45 socket (X71).

There are two types of interconnecting cables used for 10/100 MBit/s twisted pair Ethernet.

- Straight-through twisted pair cable
- Crossover cables (transmitting and receiving lines are crossed)



The LEDs of the JetMove 206B-230...-OEM Ethernet	
Designation	Operating Principle
ACT	Activity: The JetMove 206B-230...-OEM transmits or receives data via the Ethernet.
LNK	Linkage: The JetMove 206B-230...-OEM is linked with the Ethernet

12.2.1 Connection between the JetMove 206B-230...-OEM and a PC or JetControl

Direct connection between a PC or JetControl and a JetMove 206B-230...-OEM is established by means of a crossover cable.

12.2.2 Connection between the JetMove 206B-230...-OEM and a PC or JetControl through a Switch

If connection between PC or JetControl and a JetMove 206B-230...-OEM is established through a switch, straight-through cables have to be used.

Note!

Terminals have to be interconnected by means of crossover cables:

- PC to PC
- JetControl to PC
- JetControl to JetMove...-OEM
- etc.

Terminals with infrastructure components (e.g. switch) have to be interconnected via straight-through cables:

- PC to switch
- JetControl to switch
- JetMove...-OEM to switch
- etc.

Note!

If the proper cable is not available, the uplink port of a switch/hub can be used. The pin assignment of an uplink port allows connection of terminals or can be switched over.

Some devices are provided with an automatic crossover function which ensures automatic adjustment to the cable and distant station.

12.3 Logic Circuit LEDs, Switches

12.3.1 LEDs

Logic LEDs	
ERR (red)	Flashes shortly at initializing. It remains lit in case of an initialization error at the Ethernet interface.
RUN (green)	Flashes regularly at correct functioning of the Ethernet interface.

The as-is state of the LED can be scanned in register 10182.

.

LED Error Messages	
Following power-up the red LED (ERR) and the green LED (RUN) are flashing.	The selector is in LOAD position. The boot loader is running. The OS of the Ethernet interface is neither checked nor launched.
Following power-up the red LED (ERR) flashes three times, then both LEDs (red = ERR, green = RUN) are flashing.	The selector is in RUN or STOP position. The boot loader is running. There is no valid operating system of the Ethernet interface available.
The red LED (ERR) and the green LED (RUN) are flashing alternately with intermittent breaks during runtime.	Fatal operating system error of the Ethernet interface.

12.3.2 The DIP Switches

The switches are evaluated at switching on the JetMove 206B-230...-OEM. Switches 1 through 8 influence the IP address; switches 9 through 10 influence starting the operating system.

Start-Up Process

Switches 9 and 10	
Position	Meaning
9 = OFF, 10 = OFF (NORMAL OPERATION)	Normal function of the Ethernet interface
9 = OFF, 10 = ON (LOAD)	The boot process proceeds as far as to the initial program loader of the Ethernet interface
9 = ON	Reserved

After booting, the switch has no influence to the interface functions. The current position of the mode selector can be scanned in register 10181.

12.4 Setting the IP Address

There are four ways of assigning an IP address to a JetMove 206B-230...-OEM. The actually used IP address can be scanned in register 2931.

12.4.1 Default IP Address

If, at activating the controller, DIP switches 1 through 8 are in "OFF" position, the JetMove 206B-230...-OEM has got IP address 192.168.10.15.
In case of any uncertainties with regard to the IP address used, you can use this "loophole" to set the JetControl to a defined state.

12.4.2 IP Address Out of the Configuration Memory

If, at activating the JetMove 206B-230...-OEM, the DIP switches 1 through 8 are in "ON" position, the JetControl has got the IP address saved in the configuration memory.
The configuration memory can be accessed by means of the "/System/cfgvar.ini" file or registers 10131 through 10145.

Configuration File

In order to gain access to the configuration file '/System/cfgvar.ini', the user having got the administrator rights must have been connected.
This file has the same structure as a Windows *.INI file:

```
[CFGVAR]
Version       = 4
IP_Address    = 192.128. 10. 97
IP_SubNetMask = 255.255.255.  0
IP_DefGateway = 192.128. 10.  1
BasePort      = 50000
IP_DNS        = 192.118.210.209
```

Important!

In no case change the version number!

Registers

Alternative access to the configuration memory is possible via registers 10131 through 10145.
In order to make a change via registers, first password register 10159 with password value 2002149714 (0x77566152) has to be loaded. Then, registers 10132 through 10145 are modified. Finally, the changes to the configuration memory have to be saved by entering an arbitrary value into register 10100.

Registers	Meaning	Value Used in the Example
10100	Saving the configuration values	
10131	Version number	4
10132	IP address MSB	192
10133	IP address 3SB	128
10134	IP addresse 2SB	10
10135	IP address LSB	97
10136	Subnet mask MSB	255
10137	Subnet mask 3SB	255
10138	Subnet mask 2SB	255
10139	Subnet mask LSB	0

Registers	Meaning	Value Used in the Example
10140	Default gateway MSB	192
10141	Default gateway 3SB	128
10142	Default gateway 2SB	10
10143	Default gateway LSB	1
10144	Port number of the JetIP server	50000
10145	IP address of the DNS server	0xC076D2D1 (192.118.210.209)
10159	Password	2002149714 (0x77566152)

Important!

Do not change the version number contained in register 10131.

12.4.3 IP Address Taken from the Switch Position

In all other switch positions, the IP-address is taken out of the configuration memory; the lowest-order byte (fourth octet) is substituted by the position of DIP switches 1 through 8.

To make up the IP address, the position of DIP switches 1 through 8 is read in once during the start-up procedure.
The actual settings of DIP switches 1 through 8 can be scanned in register 10180.

13 Safe Standstill (Option)

The digital servo amplifier JetMove 206B-230 does not provide the option "Safe Standstill".
As an alternative, JM-204-480-S1 can be applied in the same performance range, if working by a mains voltage of 400 V is possible, and if a motor of another back EMF constant is ordered.

Note!

The sales staff of Jetter AG will gladly assist you in the selection.

14 Counting Input (Option)

14.1 Operating Principle

For the JetMove 206B-230, an optional integrated counter card can be ordered (article designation of the device: JM-206B-230...-CNT). It supplies a counting input equipped with the following interface:

- EnDat 2.2 by Heidenhain
- Synchronous Serial Interface (SSI)
- Incremental counter

The received or counted value of an actual position can be read via a JetMove register by the controller program or processed by the firmware of the JetMove in the controllers.

14.2 EnDat 2.2

14.2.1 Technical Data

Technical Data of the Input EnDat 2.2	
Encoder types	Absolute encoders (single, multiturn or linear)
Scanning	62.5 µs
Baud rate	8 MHz
Maximum cable length	100 m
Type of signal	5 V differential signals
Input impedance	22 kΩ
Bus termination	120 Ω integrated resistance
Electrical isolation	None

14.2.2 Description of Connections

Specification of Mating Connector for X72

- 9-pin male SUB-D connector
- Metallized enclosure

EnDat Cable Specification

- Cable size: 2 * 2 * 0.14 mm² + 2 * 0.25 mm² (AWG 26(4) + AWG 23(2))
  2 * 0.25 mm² must be used for the power supply unit and for GND.
- The cables have to be twisted in pairs and included in an overall shielding
- The following signal lines have to be twisted in pairs:
  DATA - and DATA +
  Clock - and Clock +
  0 V and power supply
- The shield must be connected to the connector housings on both ends of the cable with the greatest possible surface area.
- Material: Copper
- Temperature class: 60 °C
- Maximum cable length: 100 m

14.2.3 EnDat Cable with Mating Connector

Note!

The resolver, HIPERFACE, respectively mating connector of the Jetter motor series JL, JK and JH and can be ordered from Jetter AG by supplying the following particulars:

Item # 15100069	Resolver / HIPERFACE

The complete HIPERFACE cable between the servo amplifier series JetMove 2xx and the Jetter motor series JL, JK, and JH can be ordered from Jetter AG. The resolver cable can be ordered by submitting the following cable specifications and the respective cable length in cm:

KAY_0723-xxxx	For the servo amplifier series JetMove 2xx

HIPERFACE mating connector (solder side)

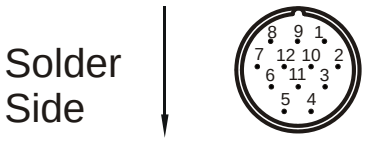
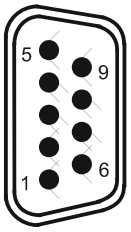
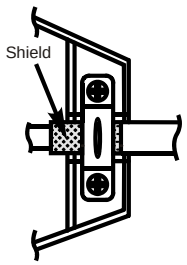
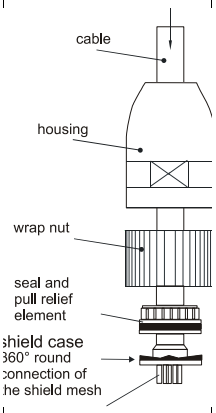
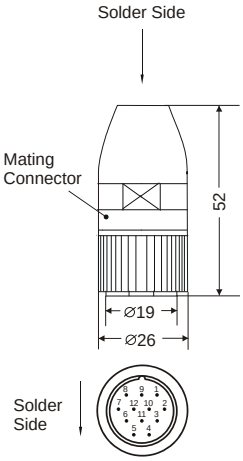


Fig.: 19: RC series mating connector of the EnDat (internal thread M23)

HIPERFACE-, EnDat Cable of KAY_0723-xxxx

JetMove 2xx (SUB-D male connector X72)	Shielding		Motor (EnDat) (female, solder side)
 Attaching screws must have a metric thread!	 5 * 2 * 0.25 mm^2		
	Connect shield with the greatest possible surface area! Use metallized housing only!		

Pin	Signal	Core Color	Pin
-	unassigned	-	1
-	unassigned	-	2
7	DATA - (RS-485)	white	3
2	DATA + (RS-485)	brown	4
8	unassigned	green	5
3	unassigned	yellow	6
6	Clock - (RS-485)	gray	7
1	Clock + (RS-485)	pink	8
4	0 V	blue	9 *)
5	5 V power supply 200 mA max.	red	10
9	unassigned	black	11
	unassigned	-	12 *)

*) Pin 9 and pin 12 are short-circuited (thermal sensor HIPERFACE)
The measurements of the EnDat mating connector are specified in millimeters.

14.2.4 Power Supply of the Encoder

The optional counter card supplies a voltage of 5 V +/- 5 %.
The EnDat encoders by Heidenhain have been specified to 3.6 through 5.25 V of 0.2 A max.. This results in a maximum voltage drop of ΔU = 1.15 V on the EnDat cable. The voltage drop can generally be calculated as follows:

$$\Delta U = \frac{2 \cdot I_n \cdot l}{\gamma \cdot A}$$

This results in the maximum cable length or in a minimum cable cross section:

$$l = \frac{\Delta U \cdot \gamma \cdot A}{2 \cdot I_n} = 161 \cdot \frac{m}{mm^2} \cdot A$$

$$A = \frac{2 \cdot I_n}{\Delta U \cdot \gamma} = \frac{mm^2}{161 \cdot m} \cdot l$$

Given	ΔU :	Voltage drop in V
	I_n :	Current consumption by the measuring device in A
	A :	Cross section of the supply cable in mm^2
	l :	Cable length
	γ :	Electric conductivity (for copper: $56 \frac{m}{\Omega mm^2}$)

Example:
At a cable cross section of 0.34 mm^2, there results a maximum cable length of l = 54.74 m or - at a cable length of 80 m - the following cross section is needed: A = 0.55 mm.
By a double wiring arrangement, the cable length can be doubled.

14.3 Synchronous Serial Interface (SSI)

14.3.1 Technical Data

Technical Data of the SSI Input	
Encoder types	Multiturn absolute encoder
Scanning	up to 2 ms
Transmission rate	100 kHz ... 1 MHz
Maximum cable length	50 ... 100 m
Type of signal	5 V differential signals
Input impedance	22 kΩ
Bus termination	120 Ω integrated resistance
Electrical isolation	None

14.3.2 Description of Connections

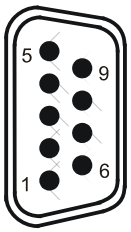
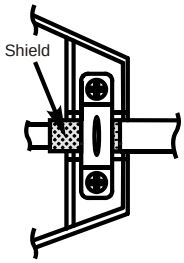
Specification of Mating Connector for X72

- 9-pin male SUB-D connector
- Metallized enclosure

Specification of the SSI Cable

- Cable size: 2 * 2 * 0.14 mm² + 2 * 0.25 mm² (AWG 26(4) + AWG 23(2))
  2 * 0.25 mm² must be used for the power supply unit and for GND.
- The cables have to be twisted in pairs and included in an overall shielding.
- The following signal lines have to be twisted in pairs:
  Clock - and Clock +
  DATA - and DATA +
  0 V and power supply
- The shield must be connected to the connector housings on both ends of the cable with the greatest possible surface area.
- Material: Copper
- Temperature class: 60 °C
- Maximum cable length: 100 m
  Dependent on the encoder type, the transmission frequency has to be reduced due to the signal runtimes in long cables.

14.3.3 SSI Cable

SSI Cable		
JetMove 2xx (SUB-D male connector X72)	**Shielding**	**Specification of the Cable**
		Encoder signal: 5 V differential signal Maximum cable length: 100 m
Attaching screws must have a metric thread!	Connect shield with the greatest possible surface area! Use metallized housing only!	
Pin	**Signal**	
1	Clock +	
2	DATA +	
3	do not use	
4	0 V	
5	Power supply 5 V, 200 mA max.	
6	Clock -	
7	DATA -	
8	do not use	
9	do not use	

14.4 Incremental Encoder

14.4.1 Technical Data

Technical Data of the Incremental Encoder Input	
Encoder types	Rotatory or linear encoders
Scanning	62.5 µs
Maximum counting rate	20 MHz
Maximum cable length	100 m
Type of signal	5 V differential signals
Input impedance	22 kΩ
Bus termination	120 Ω integrated resistance
Electrical isolation	None

14.4.2 Description of Connections

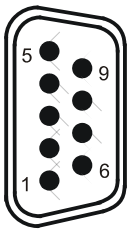
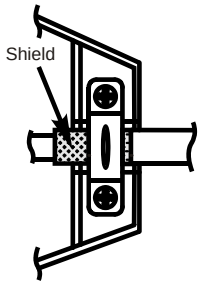
Specification of the Mating Connector for X72

- 9-pin male SUB-D connector
- Metallized enclosure

Specification of the Incremental Encoder Cable

- Cable size: 3 * 2 * 0.14 mm² + 2 * 0.25 mm² (AWG 26(6) + AWG 23(2))
  2 * 0.25 mm² must be used for the power supply unit and for GND.
- The cables have to be twisted in pairs and included in an overall shielding.
- The following signal lines have to be twisted in pairs:
  K0 - and K0 +
  K1 - and K1 +
  K2 - and K2 +
  0 V and power supply
- The shield must be connected to the connector housings on both ends of the cable with the greatest possible surface area.
- Material: Copper
- Temperature class: 60 °C
- Maximum cable length: 100 m

14.4.3 Incremental Encoder Cable

Incremental Encoder Cable		
JetMove 2xx (SUB-D male connector X72)	**Shielding**	**Specification of the Cable**
		Encoder signal: 5 V differential signal Maximum cable length: 100 m
Attaching screws must have a metric thread!	Connect shield with the greatest possible surface area! Use metallized housing only!	
Pin	**Signal**	
1	K0 +	
2	K1 +	
3	K2 +	
4	0 V	
5	Power supply 5 V, 200 mA max.	
6	K0 -	
7	K1 -	
8	K2 -	
9	do not use	

15 Ordering Information

15.1 List of Documentation

The documents listed below have been supplied on the website of Jetter AG at http://www.jetter.de/Support for download.

Programming

jetmove_2xx_at_jetcontrol_bi_xxxx_user_information.pdf
User information on configuration and operation of the JetMove 2xx series at the JetControl 24x
Item # 60874950

jetmove_1xx_2xx_D203_at_the_jetcontrol_bi_xxxx_user_information.pdf
User information on configuration and operation of the JetMove 2xx series at the NANO-B/C/D
Item # 60866113

15.2 Options

Designation	**Ethernet Interface** (Page 85)	**Analog Input** (Page 83)	Counting Input (Page 93)
JM-206B-230			
JM-206B-230-OEM	✓		
JM-206B-230-IA1		✓	
JM-206B-230-CNT			✓
JM-206B-230-OEM-IA1	✓	✓	
JM-206B-230-OEM-CNT	✓		✓

Appendices

Appendix A: Recent Revisions

Chapter	Remarks	Revised	Added	Deleted
1.1.2	JetMove is no safety-related part		✓	
1.1.3	Personnel qualification	✓		
1.2.3 7.1	"Neutral conductor" instead of "Direct earth conductor"	✓		
2.1	Mounting accessories	✓		
3	Operating conditions	✓		
5.1	Electrical specifications	✓		
7	AWG numbers		✓	
7.2.1	Motor connection General remarks	✓		
7.2.2	Note on free-wheeling diode, in revision 3.02	✓		
7.4.2	Specification of HIPERFACE cable	✓		
7.5	Sin-cos encoder connection		✓	
7.6	Specification of terminal X10		✓	
7.6	Note on free-wheeling diode	✓		
9.1	Error messages F38, F39, and F40		✓	
10	Note on free-wheeling diode	✓		
12	Ethernet interface (option)		✓	
13	Safe Standstill		✓	
14.2.3	EnDat cable specification	✓		
15	Ordering information		✓	
Appendix E	Index	✓		
	Style and spelling have been revised			
	Addresses	✓		

Appendix B: Differences between JetMove 206-230 and JetMove 206B-230

The JetMove 206-230 servo amplifier has been developed further to become the servo amplifier JetMove 206B-230.
The objectives of this further development have been the following:
- To save components, in order to achieve greater dependability
- To grant an uncomplicated installation procedure
- To decrease the amount of various models

In the development process, special attention was paid to providing a large scope of interchangeability.

Of course, there will still remain certain differences which must be considered in individual causes.

Automatic Encoder Recognition

The JetMove 206B-230 is not equipped with two varieties for different position transducers any more. (Up to now, the customer had to decide whether to order the JetMove 206-230-RE servo amplifier for the resolver input circuit or the servo amplifier JetMove 206-230-HI for the Hiperface input circuit.)
The JetMove 206B-230 servo amplifier can automatically recognize which encoder has been connected to it and configure its input circuit respectively.

Consequences for the user:
- Even with both encoder types being applied, double stock-keeping can be avoided.
- Irrespective of the encoder type used, the order number is the same.

Enclosure

The enclosure of the servo amplifier JetMove 206B-230 has been adjusted to that of the amplifiers JetMove 203-230-x and JetMove 215-480-x, thus emphasizing the homogeneity of the amplifier product family.

Consequences for the user:
- None, as the layout of the plugs, the outside measurements and the mounting holes have remained unchanged.

Installation in Control Cabinet

Thanks to the new enclosure it is now possible to fix the JetMove 206B-230 by two screws only to the middle fixing holes in the control cabinet. The two outer mounting hole pairs are exactly at the same position as the mounting holes of the servo amplifier JetMove 206-203. Thus interchangeability is realized.

Consequences for the user:
- The installation in the control cabinet will be simplified.

Preparation for UL Certification

On the development of the servo amplifier JetMove 206B-230 special attention was given to UL certification.

Consequences for the user:
- In future, the JetMove 206B-230 can also be acquired together with a UL-certificate.

Power Factor Correction

Using a 1-phase power supply the servo amplifier JetMove 206-230 was operated with a power factor correction circuit. In the JetMove 206B-230 amplifier, this has not been applied any more.

Consequences for the user:
- In case of a 1-phase connection, the DC link voltage in motor mode (no feedback by braking) is 325 V instead of 380 V. As a result, the maximum possible motor speed will be reduced by approximately 15 %. Moreover, the DC link voltage now is directly proportional to the input voltage and no longer independent of it.
- The effective value of the network input voltage in 1-phase operation at the same motor performance is about 2.3 times greater. In any case it will remain below the crucial fusing value of 10 amps, provided that motor output power does not exceed 1 kW.

Operating from a 3-phase power supply, there will be no differences.

Appendix C: Glossary

AC	**A**lternating **C**urrent: Alternating current
CE	**C**ommunautés **E**uropéenes European Union
DC	**D**irect **C**urrent
DIN	**D**eutsches **I**nstitut für **N**ormung e.V. = German Industry Standard
EG	**E**uropäische **G**emeinschaft = European Union
EC Low Voltage Directive	To be considered when using electric devices of a rated voltage between 50 and 1,000 V AC and between 75 and 1,500 V DC.
Electro-Magnetic Compatibility (EMC)	Definition according to the EMC regulations: "EMC is the ability of a device to function in a satisfactory way in an electro-magnetic environment without causing electromagnetic disturbances itself, which would be unbearable for other devices in this environment."
EN	**E**uropäische **N**orm = European Standard
ESD	**E**lectro**s**tatic **D**ischarge
Hazard analysis	Excerpt from the Machinery Directive: "The manufacturer is under an obligation to assess the hazards in order to identify all of those which apply to his machine; he must then design and construct it taking account of his assessment."
HIPERFACE	**Hi**gh **Per**formance Inter**face** HIPERFACE designates a sensor-transducer system by Sick / Stegmann. The SinCos motor feedback system with the standardised HIPERFACE interface is often used in digital drive technology. Unlike the resolver, the SinCos motor feedback system with HIPERFACE interface contains electronic components. Over several motor rotations, a HIPERFACE will report the absolute position values; this cannot be performed by a resolver. A HIPERFACE is far more precise than a resolver, but also more expensive.
IEC	**I**nternational **E**lectrotechnical **C**ommission
IP	**I**nternational **P**rotection
JetMove	JetMove is the type designation of a digital servo amplifier series produced by Jetter AG. The extension 206B-230, for example, marks the following features: – 206 identifies a rated current of 6 A. – 230 identifies the operating voltage of the rated power supply.

Jetter system bus	The Jetter system bus is a system bus system of a cable length of 200 m max. and of fast data transmission rates of 1 MBit/s max. In addition to this, the Jetter system bus is highly immune to interferences. Therefore, the Jetter system bus is suited to realise field bus applications in a limited space.
JetWeb	Control technology comprising control systems, motion systems, user interfaces, visualization devices, remote I/Os and industrial PCs. Programming by means of multitasking and a modern sequence-oriented language. Communication by means of Ethernet TCP/IP and making use of the Web technologies.
Motor circuit-breaker	A circuit-breaker with monitoring functions as to phases and temperature of a motor
NN	**N**ormal **N**ull = Sea Level
PE	**P**rotective **E**arth: "Protective Earth", respectively "Protective Earth Conductor"
Resolver	Feedback unit at a servo motor for determining the absolute position within one revolution. Other than a HIPERFACE, the resolver will not provide any information on how many revolutions the motor has performed so far. A resolver could be envisaged as a transformer; the couplings of its secondary windings (sine and cosine) change in relation to the position of the motor shaft. Basically, a resolver consists of a rotor with one coil and a stator with two coils. The stator windings are displaced by 90° (sine and cosine). The resolver itself does not contain any electronic components.
SELV	Safe Extra Low Voltage: Voltage, which, under all operating conditions will not exceed a peak or DC voltage of 42.4 V. This voltage is either measured between two conductors or between one conductor and earth. The circuit, in which this voltage occurs, must be separated from the mains power supply by a safety isolating transformer or some equivalent.
SUB-D	Type name of a plug-in connector
t_r/t_h	**t**ime **r**ise / **t**ime **h**old: "Rise time of a pulse / total hold time of a pulse"
t_r/t_n	**t**ime **r**ise / **t**ime **n**ormal: "Rise time of a pulse / total duration of a pulse"
TN network	Supply network which is solidly earthed in the neutral point and which is equipped with a protective earth conductor.

TT network	Supply network which is solidly earthed in the neutral point, yet, which is not equipped with a protective earth conductor. Earthing is carried out by means of a local protective earth.
UL	**U**nderwriters **L**aboratories Inc.
VDE	**V**erband **d**eutscher **E**lektrotechniker e.V. = Association of German Electrical Engineers
DC link voltage	DC circuit within a servo drive on the basis of which the motor currents are generated.

Units:

A	Ampere
mA	Milliampere (1 mA = 10^{-3} A)
dB	Dezibel
g	Gram
h	Hour
Hz	Hertz
K	Kelvin
m	Meter
cm	Centimeter (1 cm = 10^{-2} m)
mm	Millimeter (1 mm = 10^{-3} m)
s	Second
V	Volt
µV	Microvolt (1 µV = 10^{-6} V)
W	Watt
Ω	Ohm
°C	Degrees centigrade (temperature unit)
°	Degrees (angular dimension)

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